1858 FIFTY-EIGHTH YEAR 1917

Engineering Library
Chemical Lib.
JAN 22 1917
UNIV. OF MICH.
LIBRARY

AMERICAN GAS ENGINEERING JOURNAL

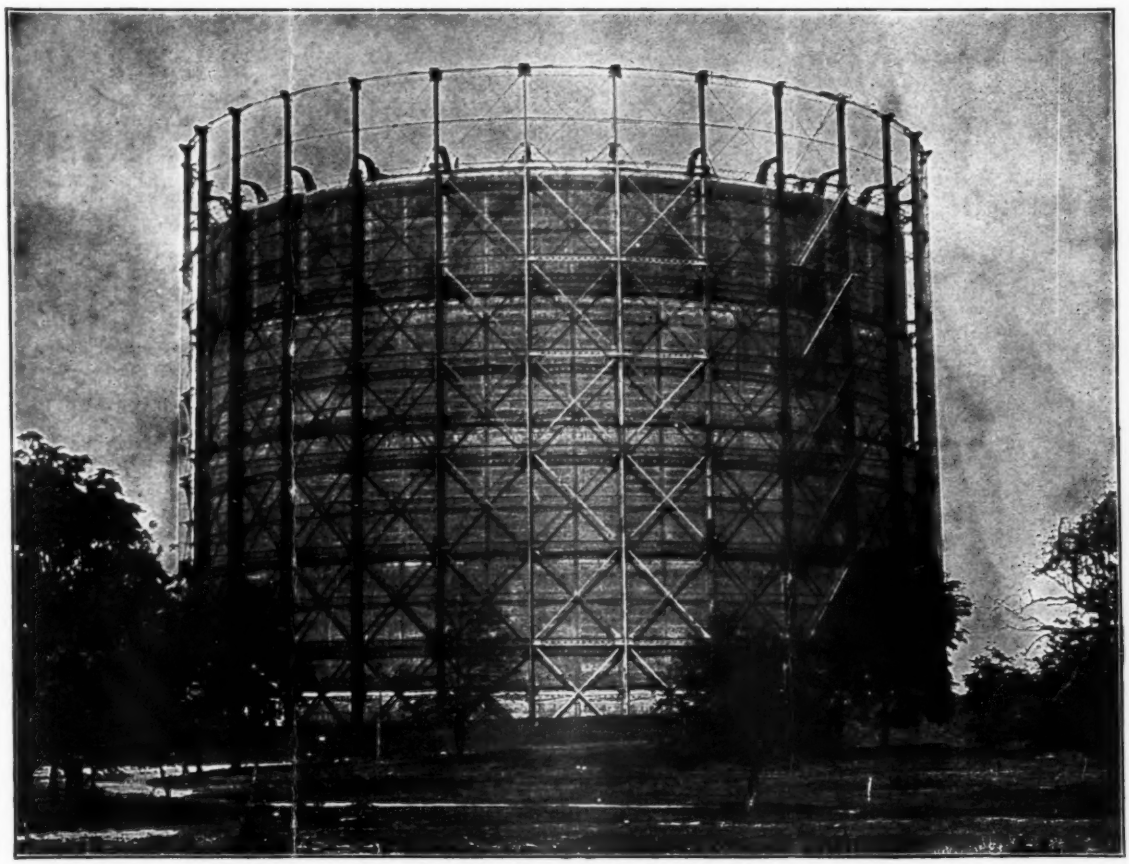
FORMERLY

AMERICAN GAS LIGHT JOURNAL

VOL. CVI., NO. 4
WHOLE No. 3072

NEW YORK, SATURDAY, JANUARY 20, 1917

Subscription $3 per year
$4 Canada $5 Foreign



THE LARGEST GAS HOLDER IN THE WORLD

15,000,000 Cubic Feet Capacity

BUILT BY

THE BARTLETT HAYWARD CO.

BALTIMORE NEW YORK

INDEX TO CONTENTS, PAGE 84

ADVERTISERS' INDEX, PAGE 18

KOPPERS

BY-PRODUCT
COKE AND GAS OVENS

The most efficient method of carbonizing coal is in KOPPERS OVENS and the best coke and by-products are produced by this process.

H. KOPPERS COMPANY
Pittsburgh, Pa.

Builders of

By-Product Coke and Gas Plants
Tar Distilling Plants
Ammonia Recovery Plants
Benzol Recovery Plants

AMERICAN
GAS ENGINEERING JOURNAL

FORMERLY THE AMERICAN GAS LIGHT JOURNAL

Vol. CVI, No. 4 NEW YORK, JANUARY 20, 1917 Whole No. 3072

Grooved Trap in Which Foreign Matter Invariably Accumulates Eliminated in Improved Valve

No Valve Up to Present Time Has Been Found Absolutely Tight After It Has Been in Use a Comparatively Short Time—Foreign Matter Removed Automatically in New Type

By D. E. KEPPELMANN
General Superintendent of Gas Distribution, Pacific Gas and Electric Company, San Francisco, Cal.

You are familiar with valves, their construction and faults, hence are aware of the fact that the present construction remains identically the same since the inception of valves years ago. It is a fact that the same principle of construction and idea is true of valves from the day of their original invention up to the present time.

Progress has been and is the effort of every line of endeavor, improvements being the constant demand. To realize that success has marked such efforts one need merely to recall to mind the wonderful progress made in the steam engine, steam boat, automobile, aeroplane, submarine, and agricultural implements; in fact, so much so that they have almost lost their original identity. Improvements have been made in every mechanism known with the possible exception of the gas meter and valves. Our effort therefore has been to remove valves from this catagory.

" Pacific Service " has pioneered hydro-electric, is the father of high-pressure gas transmission, has developed a new process of oil gas manufacture as well as the oxy-acetylene welding of its gas mains. These facts are indisputable and their success is well known. Not content to rest on these laurels, " Pacific Service " will again prove its progressiveness and add the Sliding Seat Valve to its growing list of improvements.

Every gate valve known depends upon a disc or discs riding into a groove between two seats for its tightness. It is a well known fact, however, that no valve up to the present time has been found absolutely tight after it has been in use but a very short time. Leaks develop through a practically new valve in a comparatively short time due entirely to the very principle upon which it is constructed. Leaks through a valve are due principally to the accumulation of foreign matter in the valve and the scoring of its disc and seats by pressures.

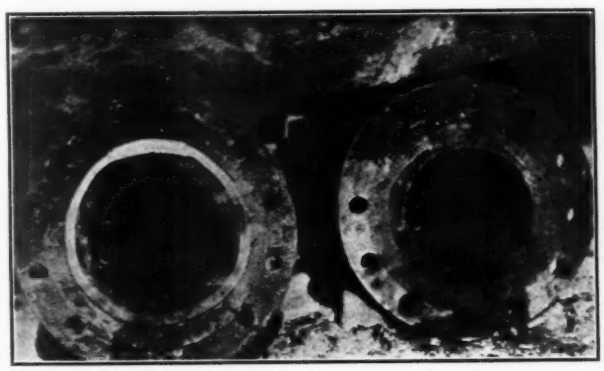


FIG. 4. ACCUMULATION OF FOREIGN MATTER IN VALVES MAKES IT IMPOSSIBLE TO CLOSE DISC

Referring to Fig. 4 you will observe the accumulation of foreign matter in the valves, making it physically impossible to close the disc, thereby rendering the valve useless. The groove in the bottom of the valve is a constant trap for deposits of foreign matter and after the groove is filled up the accumulation continues. Since valves depend for their tightness upon a disc entering the groove and if the groove has been filled with foreign matter, then it is physically impossible to lower the disc with the result that we have valves in our lines not performing the very function which impelled their installation.

This necessitates an immediate substitution with a clean valve, causing twice the cost, not to mention double the labor to install, and experience has proven that this same operation occurs time and time again. Valves are installed for a purpose and when the occasion arises to use them they are needed badly but in-

FIG. 5. DISC SCORED DUE TO HIGH PRESSURES

variably leak, leaving us in the identical position as if no valve had been installed at all. We have bought the best valves known and have paid the best prices, having spent thousands of dollars for valves which have not proven satisfactory.

The improved sliding seat valve eliminates this difficulty, for we have eliminated the grooved trap making it physically impossible for any accumulation of foreign matter. The opening and closing feature consists of a solid wedge with a port constantly riding on its seats located in the sides of the valve, creating a clean opening through the valve and eliminating the groove feature of all other gate valves.

This makes the improved valve a self cleaning valve, for with the valve open it presents a clean surface flush with the body of the valve; consequently, the foreign matter rides through since there is no trap or groove nor restriction of any kind for the accumulation of foreign matter, making it possible at all times to close the valve whenever necessary. When the improved valve is closed the foreign matter will accumulate against the wedge, but simultaneously with the lifting of the wedge this accumulation is immediately cut from the wedge and carried through the valve by the liquid or gaseous substances in the line.

Scoring of Seats

Fig. 5 is a reproduction of a disc removed from a valve showing how high pressures will score the disc, which frequently occurs, causing the valve to leak and rendering it useless. Heretofore with every high pressure valve manufactured a by-pass has been compulsory in order to equalize the pressure on both sides of the disc before the disc has been raised. Herein, however, enters the human element, the by-pass being neglected with the resultant scoring of the seats, creating leaks and rendering the valve worthless.

This scoring of seats has made practically new valves obsolete, costing thousands of dollars. This tremendous cost does not however comprise all the difficulties for, with scored seats creating leaky valves, it has been the direct cause of many near fatalities with men working in heavy laden gaseous atmospheres, not to mention the fact that many times we are compelled to shut off as many as four valves in a line to hold the pressures while work continues. Even then the leak through has been sufficient to drop the town back of us, leaving many consumers without gas until repair or construction work has been completed.

With the improved valve no by-pass is necessary, for the seats are never exposed to the elements passing through, hence scoring is impossible, eliminating leakage from this source.

Maintenance

Figs. 6-6A show a comparison of the old style gate valve and new improved valve. You will immediately observe the relative size of a 4-in. old style compared with a 4-in. new style. With the old style the ratio between sizes increases whereas compared to the new style the ratio decreases, hence the greater cost to install an old style compared with a new style valve.

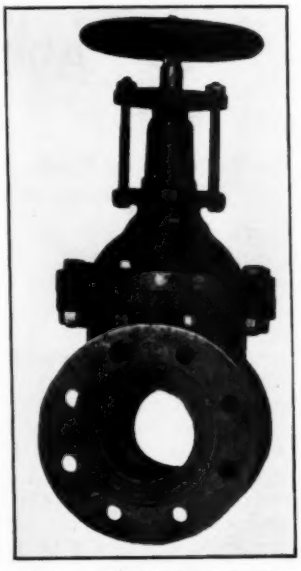


FIG. 6. OLD STYLE GATE VALVE

It costs 20 per cent. more to manufacture the old style compared with the new valve, which is a fact not to be overlooked.

It costs considerably more to maintain the old style valve with its accumulation of foreign matter and with its scored seats as it is relegated to the scrap pile; whereas the improved valve eliminates maintenance with its self-cleaning feature and its non-scoring seats as hereinbefore shown.

Standardization

Fig. 7 shows the improved valve, front and side view.

FIG. 6A. NEW IMPROVED TYPE

This valve permits of standardization in the fact that it can be used for gas, water, steam, air, oil, and acids under low, medium, or high pressures. It also readily adapts itself to a quick opening and closing valve with but slight change in its construction.

Fig. 8 shows the working parts of the improved valve. You will immediately observe the simplicity of its construction as well as its mechanical appearance.

Efficiency, or a perfect valve when needed, has

SPECIFICATIONS

Fig. 1 is a vertical transverse section of the valve of the invention.

Fig. 2 is a vertical longitudinal section of the valve of the invention.

Fig. 3 is a top view of the assembled valve of the invention.

The embodiment of the invention is a double wedge-shaped sliding gate valve.

The invention contemplates the wedged-shape gate.

This gate slides upon two wedged-shape seats, and by means of elliptical springs and is forced tightly upon them, and when this valve is closed by means of the wedges we get a tightly closed valve.

By virtue of this construction the foregoing objects are gained and the difficulties overcome.

In Fig. 1 is shown the invention embodied in a duplex wedge valve, the valve being arranged in such a manner as to show in detail the outside housings and the working elements.

The seats are fastened to the housing and are machine finished.

No. 7 is a removable plate which contains wedge No. 9 and spring No. 15 and No. 16.

No. 1 is the duplex wedge gate which slides upon seats No. 2. This gate contains a threaded screw as shown at No. 35 and an opening through it is as shown at No. 19. It also contains the wedge No. 10.

No. 17 is the screw which is threaded into the gate as shown at No. 35. This is connected at its outer end to a hand wheel No. 12 by means of nut No. 18.

By means of this arrangement the hand wheel is used to slide the gate open or closed.

In the position as shown the opening No. 19 in the gate is directly opposite the opening in the housing and the valve is open.

To close the valve the wheel No. 12 is turned until the gate moves into the position as shown by the dotted lines. In this position the solid portion of the gate is directly over the opening in the housing. The wedges No. 9 and No. 10 are now engaged, and when force is used to turn the wheel these wedges force the gate No. 1 against seats No. 2, thereby making a tightly closed valve.

No. 4 is a collar, which is a portion of the screw No. 17, and is solid thereto. It fits snugly between the recessed packing nut No. 5 and the recessed portion of the housing No. 20. By means of this arrangement the screw is prevented from moving parallel to its axis, but is allowed to revolve.

Flange No. 6 is a packing gland which fits into the recess nut No. 5, and when tightened by means of nuts No. 21 and No. 22, forces the packing No. 23 tightly against screw No. 17, thereby preventing any leakage around the screw and out of the valve.

No. 24 and No. 25 are lugs fastened tightly into the housing at No. 26 and 27, but loosely through the packing gland at No. 28 and No. 29. This allows the packing gland to be moved by nuts No. 21 and No. 22 parallel to the axis of the screw No. 17.

No. 30 is a thin gasket of metal which is placed between housing No. 14 and plate No. 7 and is clamped tightly in place by means of the nuts on the outside of the plate. This gasket prevents any leakage out of the valve between the plate No. 17 and the housing of No. 14.

No. 31 and No. 32 are flanges by means of which the valve is connected to pipe flanges.

No. 33 and No. 34 are two of a series of lugs which are fastened tightly into the housing of the valve at one end and protrude loosely through the plate of the valve.

been the aim. That this has been accomplished is proven in the fact that the improved valve will pass every known test.

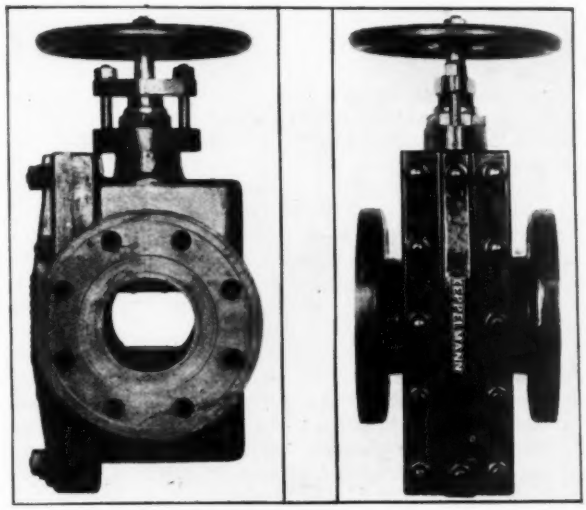


FIG. 7. FRONT AND SIDE VIEW OF NEW VALVE

Tightness is the essential feature of a valve, still the fact remains that we have no tight valve, and this is true of the best valves procurable. They all leak in a comparatively short time, often after raising and lowering the disc but once.

The improved valve will not leak under the same conditions that every other known valve will. Manufacturers, beyond the question of a doubt, test their valves before delivery and they are tight, but installed under actual working conditions will leak in a very short time.

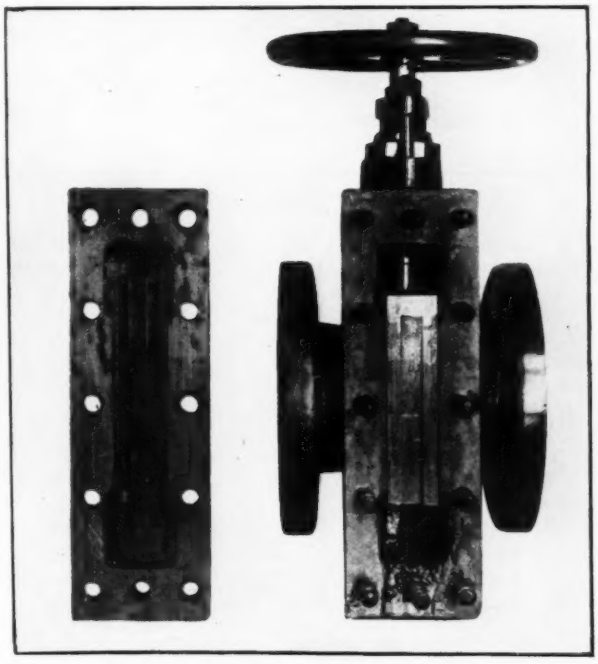


FIG. 8. WORKING PARTS OF NEW VALVE

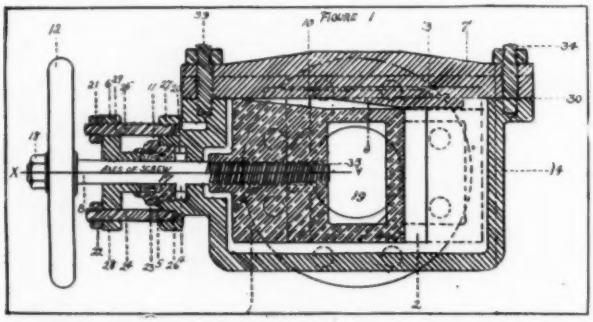


FIG. 1. TRANSVERSE SECTION OF NEW VALVE

The very theory upon which the improved valve is constructed assures its absolute tightness. The sliding wedge when closed hermetically seals the valve. In shop practice it has passed every test, as well as being absolutely perfect, both clean and tight, after six months installed in the earth under actual working conditions.

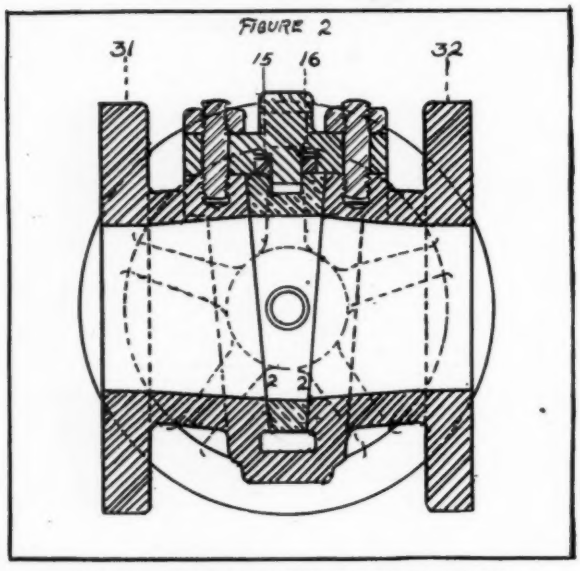


FIG. 2. VERTICAL LONGITUDINAL SECTION

The disc or discs of old style valves will always stick after being installed a very short time, necessitating a leverage to raise the discs; resulting in many twisted stems, creating a large repair cost. The improved valve cannot be made to stick and will disengage without leverage of any kind. A pressure equivalent to three tons was exerted against the wedge, and the wedge disengaged without any effort whatsoever.

With the old style valve there is no compensation for wear, and, after the disc has been raised and lowered a few times, it has worn the seats sufficiently to create a leak.

The new valve with its wedge constantly riding on its seats together, with its elliptical springs, compensates for all wear and is always tight under all conditions.

The old valve with its construction must always be installed upright in the line. If installed horizontally the disc will sag to the lower side and when closed the disc is forced into position in the groove between its seats, causing greater wear on the lower side of its seats, immediately creating leaks.

The new valve can be installed in the line in any position whatsoever, for the wedge constantly riding on its seats in a guide together with the pressure exerted by two elliptical springs absolutely prevents sagging of the wedge at all times when open or closed.

We have been for years looking for a valve to overcome but a few of our difficulties, which finally has been accomplished, and inadvertently have made additional improvements which will unquestionably revolutionize the manufacture of valves. Engineers have pronounced it a wonderful improvement over the old style valve and proclaim it to be all we claim for it, and, while all praise it, none have found a single fault.

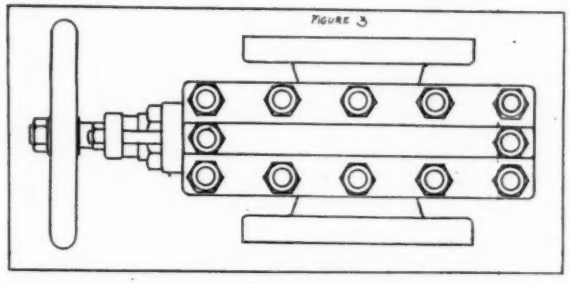


FIG. 3. TOP VIEW OF ASSEMBLED VALVE

Workman Must Benefit by His Increased Productivity to Promote Efficiency

The object of so-called scientific management is the elimination of waste, and to do that one must have the co-operation of the working team, and that co-operation cannot be secured unless the workman is to be given a part of the benefit of his increased productivity, asserted James Logan, former mayor of Worcester, Mass., in a recent address before the Worcester Branch Association of the Worcester Polytechnic Institute Alumni. It often happens that the workman is not conscious of waste, and even when conscious of waste his thought is almost always applied to the raw material which he is manipulating, but that after all is not the largest waste in industry.

The greatest waste in industry at present is time. And no amount of scientific management can add to it a single second. The best that can be done is to use the time that is given to us to the best advantage, and that can only be done by giving thought as to how work is done, ought to be done, can be done, must be done, to produce the most efficient results.

This does not mean that men and women shall work harder but that they shall give thought to their work and so work with more intelligence, using their heads as well as their hands, and by so doing often accomplish more while giving out less physical and nervous energy than by former methods of working.

Time is often used as though it were the cheapest thing in the world, and yet it is the most costly thing in the world, for it is what life is made of. It is the yardstick by which is measured the cost of everything we buy or sell, for the time consumed in producing anything determines the price at which it can be sold. The time is here when every man who lays any claim to business ability will have to keep the question of waste of both material and time constantly before him.

Various Factors Insure Continuance of Large Market for Benzol After European War Has Ended

F. W. Sperr, Jr., Enumerates Uses That Insure Permanence of Benzol Recovery Industry—Describes Typical Plant—Present Output 40,000,000 Gal.

One of the most noteworthy achievements in American chemical industry during these last two eventful years has been the rapid development of the recovery of benzol from coal gas. Associated principally with the manufacture of by-product coke, the business of recovering benzol in this country had previously lagged behind the parent industry which was already beginning to make striking progress three or four years before the outbreak of the great war. The lag was due, partly, to a seeming lack of real demand for the material, partly to the abundance of petroleum and partly, also, to the groundless fear that the operations necessary for the recovery of benzol would add too many complications to the manufacture of by-product coke.

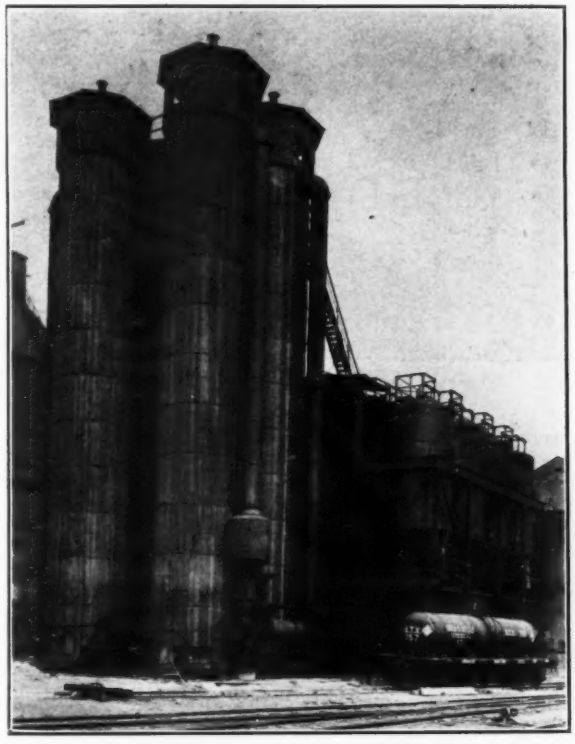
Thus at the close of 1913 there were about sixteen plants in the United States making light oil from coke oven gas. Most of the product from these plants was used for the enrichment of illuminating gas, leaving a comparatively small amount of material for other purposes. There were only two or three small plants for the manufacture of pure benzene, toluene, etc.

Even at that time, however, there were signs that the importance of the recovery of benzol was gaining recognition, and it is likely that the advancing price of gasolene would soon have led to a large extension of the industry even without the stimulus of war prices, declared F. W. Sperr, Jr., chief chemist of the H. Koppers Company, in his paper on the *"Recovery of Benzol from Gas"—from which the following has been taken—presented before the American Institute of Chemical Engineers in New York City, Jan. 12.

From the close of 1914 to the summer of 1915 the prices of benzol products rose with the cessation of foreign supply and the ever-increasing necessities of the munition business, until pure benzene commanded over 80 cents per gallon, and toluene was sold as high as $7 per gallon. The response was rapid. The first complete modern plant for the large scale production of pure benzene and toluene was put into operation in May 1915, and the total production of benzol products in the United States in that year rose to over twenty-two million gallons—more than twice as much as had been produced the previous year.

Production After the War

At present writing (Jan. 1, 1917) there are about forty benzol recovery plants in operation in connection with by-product coke plants, having a capacity of approximately thirty million tons coal per annum. Making due allowance for the fact that a number of these plants scrub only part of their gas and that part of the benzol is immediately used for enrichment, a conservative estimate would place the present annual light oil production at not less than forty million gallons. Three of these plants are now being enlarged, and eight new plants are in course of construction. The completion of this new work will bring the annual production of light oil up to nearly fifty million gallons.



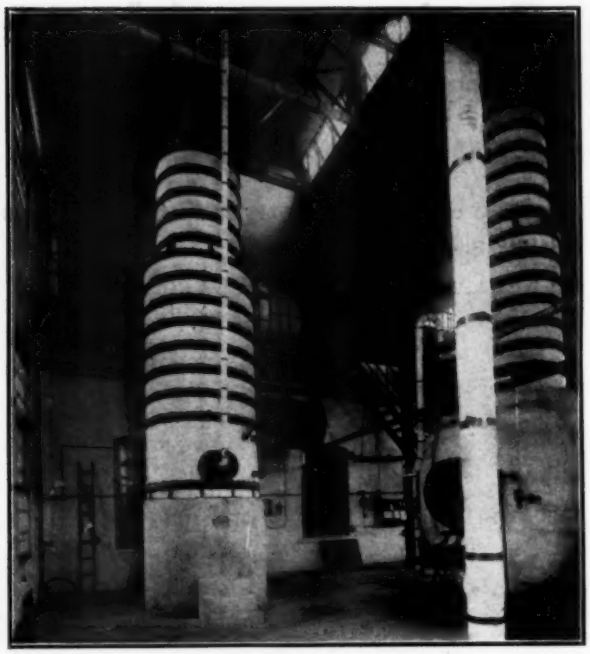
GAS COOLERS AND BENZOL SCRUBBERS

The prices of benzene and toluene, although lower than the abnormal figures of two years ago, are still firm, the former at about 55 cents per gallon and the latter at about $1.75 to $2.50 per gallon.

It is to be especially noted that the increase of output has been almost altogether in the production of pure products; the amount of unrefined benzol now being made is probably actually less than was made in 1914. It appears probable that at least 80 per cent. of the present production is redistilled for the preparation of pure benzene and toluene.

The question is frequently asked: "What will become of this vast production of benzol after the war?" It must be remembered, in the first place, that the use of the benzol group of explosives, particularly trinitrotoluol and tetranitroaniline, is by no means confined to military purposes, and their consumption for com-

* Copyrighted 1917 by H. Koppers Company, Pittsburgh, Pa., Proprietor. Printed by Permission.



WASH OIL STILL AND CRUDE STILL

mercial blasting operations will doubtless increase to a very large extent, because the war has given such a convincing demonstration of their superior qualities. The demand for military explosives is likely to continue on a considerably greater scale than before the war on account of the increased amount of military training that is being required in every country, and on account of the general recognition of the wisdom of accumulating and storing large reserve supplies of the principal explosives. It is one of the peculiar merits of trinitrotoluol that it can be stored indefinitely without risk of deterioration, and the importance of conserving this valuable asset in national defense cannot be overestimated.

Development of Chemical Industries Insures Large Market

The vast development of American chemical industries insures a market for large quantities of benzol products to be used for synthetic purposes. Benzene itself is an indispensable source of nitrobenzene and aniline with its long series of valuable derivatives. The manufacture of synthetic phenol, which is far outstripping that of carbolic acid made directly from coal tar, may be considered as a very important outlet for pure benzene on account of the great increase in the production of the various condensation products of phenol and formaldehyde. From toluene we obtain such well-known products as benzaldehyde, saccharin, and benzoic acid. Metaxylene is the source of a rather important series of dyes. The study of the other materials obtained in smaller amounts in coke oven benzol and available for the production of many interesting series of synthetic chemicals has barely begun, but promises to afford striking results in the not far distant future.

Passing thus briefly over the consumption of benzol in the chemical industries, let us consider its employment as motor fuel. So far as bulk is concerned this bids fair to surpass any other possible source of demand. Previous to the war, Germany used over 50 per cent of its benzol production for the operation of internal combustion engines. J. S. Critchley, president of the British Institution of Automobile Engineers, is quoted as stating that the carburation of benzol presents no difficulties and that in actual practice the material gives an increase of mileage of about 20 per cent. over gasolene, affording at the same time 12 to 15 per cent. more power. A series of tests made in 1913 at Brooklands, England (*Gas World*, Sept. 6, 1913, Coking and By-Product Section, page 9) showed an average of 5 miles increase per gallon.

The demands of the automobile industry alone are so great as to preclude the possibility of any destructive competition between benzol and gasolene.

As was stated early in this paper the benzol recovery plants now in course of construction, together with those already operating, will make an annual production of about fifty million gallons of benzol. There are now over two million automobiles in operation in this country, so that the contemplated benzol production would give each machine about 25 gal. If all the coke that the country now requires were coked in by-product ovens with benzol recovery apparatus we should expect a total annual benzol production of about 110 million gal. or 55 gal. per machine. This total benzol production would be less than half the amount of gasolene and naphtha exported in 1915.

Quantities Used in Manufacture of Paints, Varnishes, Etc.

Other uses of benzol may be rapidly summarized for sake of completeness. Quantities are employed in the manufacture of paints, stains, varnishes, and lacquers; in the cleaning industry; in the extraction of grease and fats; as solvents for rubber and for the manufacture of artificial leather and insulating materials.

Lastly, may be mentioned one use which should be considered rather as an economic waste than of benefit to the industry. This is for enriching illuminating gas to make it conform with antiquated candle power standards based on the use of flat flame burners.

The utilization of mantle burners and the increasing tendency to replace old candle power specification by calorific standards, already universally adopted in more advanced European practice, will doubtless soon do away with the necessity for gas enrichment, and make it possible for large illuminating gas plants to recover their benzol and utilize it for more rational purposes.

Before proceeding with the technical description of the benzol recovery process, it may be well to give a few moments' consideration to the gas from which the material is extracted. The gases produced by the high temperature distillation of coal are extremely complex in composition, but we may consider their constituents as grouped in two classes, viz., easily condensable and difficultly condensable substances, the former solid, liquid or very soluble in water at ordinary temperatures; the latter gaseous and difficult to liquefy.

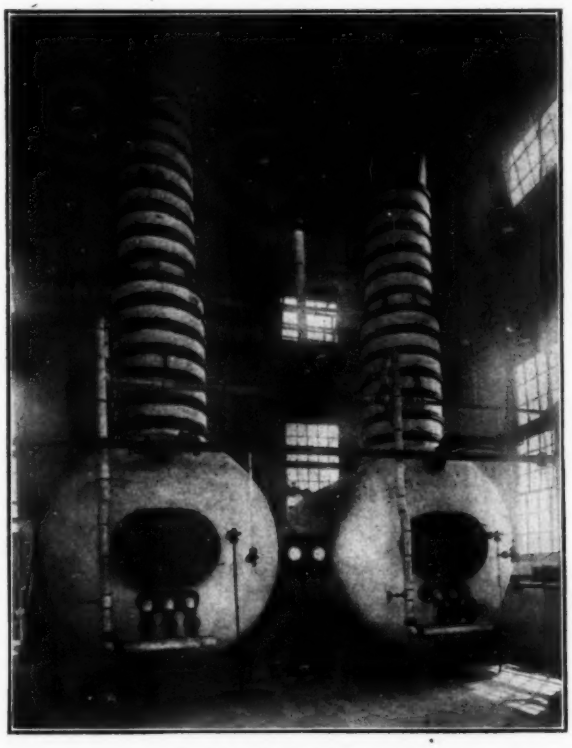
Most of the substances of the first group, such as water, ammonia, and the heavy hydrocarbons of tar, are removed by the usual operations of condensation and treatment with fresh water or acid. The amount and nature of the easily condensable substances left

in the gas after undergoing these operations depends upon the vapor tension of each. Substances of a relatively high vapor tension such as benzene and toluene remain to a large extent uncondensed. Only 5 per cent. of the total benzol in the gas is removed with the tar in the condensing plant. Actually of course the gas, after leaving the plant, contains slight amounts in the form of vapor, of all the original condensable substances, but the quantities of substances having higher boiling points than that of naphthalene—218 deg. cent. —are practically negligible.

Exclusive of water, the easily condensable vapors remaining in ordinary coke oven gas after the usual process of condensation and ammonia recovery, amount to about 1 per cent. by volume of the gas. They might be removed by cooling the gas to a very low temperature and this was actually done on a large scale in Europe some years ago, but the method was handicapped by mechanical difficulties largely due to the separation of ice and has been altogether abandoned.

The only practical alternative which can be employed to recover these vapors, without altering their chemical constitution, is to treat the gas with a medium in which the vapors are soluble and from which they may be recovered by simple distillation.

This is the principle of every benzol recovery process in operation at the present time. It appears to have been first employed in 1859 by Vogel, who washed coal gas with fatty oils for recovering the benzol. It is peculiar that Vogel had only the idea of enriching these oils so as to improve their quality for illuminating purposes. Various processes for extracting benzol based on this principle were later patented, but it was not until 1887 that it was put into successful commercial operation. This was done in Germany by F. Brunk, who is generally acknowledged as being the founder of the modern benzol recovery industry.



CRUDE AND PURE STILLS

Maximum Yields of Benzene and Toluene Obtained at Moderate Coking Temperatures

It is a peculiar circumstance that the condensable hydrocarbon vapors belong almost entirely to the aromatic series. Benzene, together with its homologues, toluene and the xylenes, constitutes over 85 per cent. Other substances present in much smaller amounts are carbon disulphide, thiophene, pyridine, naphthalene, and various olefines of both cyclic and open chain structure. Members of the paraffin series of hydrocarbons are almost entirely absent. The mode of formation of these compounds in the destructive distillation of coal, the effect of various conditions of carbonization, such as temperature and rate of heating on the character and amounts of the various substances formed, and the variation in the quality and quantity of the products from different groups of coals, are subjects of extreme interest on which our conceptions are not yet by any means clearly defined. The most important generalization that we are able to make is that the maximum yields of benzene and toluene are obtained at moderate coking temperatures. Higher temperatures have a tendency to form more benzene, apparently at the expense of the toluene and extremely high temperatures decrease the yields of both benzene and toluene.

The percentages of the more important constituents of typical coke oven light oil and the amounts usually produced per ton of coal (2,000 lb.) are given herewith.

TABLE I.

AVERAGE COMPOSITION OF COKE OVEN LIGHT OIL

	Per Cent in Light Oil.	Gallons Per Ton Coal.
Benzene	66	1.782
Toluene	15	0.405
Xylene	8	0.216
Other substances (principally hydrocarbons)	11	0.297
Total	100	2.700

For sake of convenience a table of the more important properties of some of the constituents of light oil is also inserted. In the preparation of this table the literature has been exhaustively investigated and every endeavor has been taken to present the data as accurately as possible.

In discussing the operation of a benzol recovery plant of modern type I shall deal principally with the Koppers patented process, because I have made a rather special study of this process as being typical of modern practice. To the best of my knowledge all of the coke oven benzol plants now under construction in America, with possibly one or two exceptions, are of this type.

In America the wash oil generally used to absorb the benzol is a petroleum product usually known as straw oil, of which at least 90 per cent should distil between 250 and 350 deg. cent. A good absorbent oil has a specific gravity of less than 0.88 at 15 deg. cent., and is readily fluid at 4 deg. cent. It contains no naphthalene or pitch and exerts a good solvent action on benzol. In best practice the amount of benzol absorbed (technically the "enrichment") is kept between 2 and 3

TABLE II—COMPILED BY THE LABORATORY OF THE H. KOPPERS COMPANY, MELLON INSTITUTE, PITTSBURGH, PA.

	CARBON DISULPHIDE		BENZENE		TOLUENE		M-XYLENE		NAPHTHALENE	
	Data	Reference	Data	Reference	Data	Reference	Data	Reference	Data	Reference
Formula (Molecular)	CS_2		C_6H_6		C_7H_8		C_8H_{10}		$C_{10}H_8$	
Molecular Wt. (0 = 16)	76.12	1	78.05	1	92.06	1	106.08	1	128.06	1
Lbs. per U. S. Gal. (60° F.)	10.57	2	7.36	3	7.27	8	7.26	8	9.60	5
Sp. Gr. (0°C./4°C.)	1.2921	2	0.8999	3	0.8845	4	0.8823	8	..	11
Sp. Gr. (10°C./4°C.)	1.2773	2	0.8893	3	0.8757	8	0.8738	8	..	11
Sp. Gr. (15°C./4°C.)	1.2698	2	0.8839	3	0.8714	8	0.8697	8	1.1517	5
Sp. Gr. (20°C./4°C.)	1.2623	2	0.8786	3	0.8659	3	0.8655	6	..	11
Sp. Gr. (30°C./4°C.)	1.2473	2	0.8679	3	0.8573	8	0.8574	8	..	11
Expansion Coefficient (°C.)	0.00125	2	0.0012	7	0.0010	7	0.00095	7	..	11
Boiling Pt. (760 mm. Hg.)	46.2	1	80.36	12	110.3	13	139.1	13	217.7	1
Increase in B. P. (°/mm. Hg.)	0.041	14	0.043	15	0.047	15	0.052	15	0.059	16
Vapor Pressure mm. Hg. (0°C.)	127.9	14	26.63	18	7.20	18	1.75	18	0.022	9
Vapor Pressure mm. Hg. (10°C.)	198.5	14	45.68	18	13.02	18	3.45	18	0.047	9
Vapor Pressure mm. Hg. (15°C.)	244.1	14	58.90	18	17.22	18	4.74	18	0.062	9
Vapor Pressure mm. Hg. (20°C.)	298.0	14	75.21	18	22.53	18	6.43	18	0.080	9
Vapor Pressure mm. Hg. (30°C.)	434.6	14	119.34	18	37.46	18	11.43	18	0.135	9
Lbs. per cu. ft. Vapor (60°F.-30″)	0.202	10	0.209	10	0.244	19	0.281	19	0.339	20
Kg. per cbm. Vapor (0°C.-760 mm.)	3.42	10	3.54	10	4.14	19	4.76	19	5.72	20
Heat Combustion (Net) 15°C.-760 mm. Hg.										
Cal. per kg. liquid	3480	10	9960	17	10150	17	10230	17	9700	17
Cal. per liter liquid	4420	21	8805	21	8850	21	8910	21	11170	21
B.T.U. per lb. liquid	6260	21	17930	21	18270	21	18410	21	17460	21
B.T.U. per U. S. gal. liquid	66100	21	132100	21	132600	21	133500	21	167300	21
Cal. per cu. M. vapor	11550	21	33600	21	40150	21	46500	21	52400	21
B.T.U. per cu. ft. vapor	1300	21	3780	21	4500	21	5210	21	5910	21
Sp. Heat (Cal. per kg.)	0.240	23	0.419	24	0.440	24	0.383	25	0.314	26
Heat Vaporization (cal. per kg.)	83.8	27	92.9	27	83.55	28	78.25	28	..	11
Solubility in water (22°C.):										
Gms. substance in 100 gm. H_2O	0.219	22	0.072	22	Insol.	1	Insol.	1	Insol.	1
Gms. H_2O in 100 gm. substance	0.765	22	0.241	22	Insol.	1	Insol.	1	Insol.	1
Melting Point (°C.)	−108.6	1	+5.4	1	−92.4	1	−54.8	1	+80.0	1

TABLE SHOWS IMPORTANT PROPERTIES OF SOME OF THE CONSTITUENTS OF LIGHT OIL

REFERENCES FOR TABLE II.

1. Van Nostrand's Chemical Annual, 1913
2. Thorpe, Chem. Soc. Journal, 37-364.
3. Biron, C. A. (1911) 609; Chem. Zentr. (1910. 1-1912.
4. Timmermons, Tab. Ann. de Const. (1912) 13.
5. Vöhl, Beilstein 3-II-181.
6. Brühl, Ann. 235-13.
7. Castell-Evans, Physico-Chemical Tables 1-151.
8. Calculated from data obtained in references 3, 4, 6 or 7.
9. Allen, J., Chem. Soc. 77-412, Landolt-Börnstein, 391.
10. Watt's Chemical Dictionary.
11. No reliable data available.
12. Regnault, Chem. News (Meldrum) 113-266
13. Tab. Ann. de Const (1912) 448.
14. Ramsay and Young, Chem. Soc. Journ. 47-553.
15. Lenders, Chem. Industrie (1889) 170.
16. Crafts, B1. 39-282, Beilstein 3-II-181.
17. Chemiker Kalender 1915, II 235.
18. Woringer, Zeit. for Phy. Chemie 34-262.
19. Schiff, Ann. 220-91, Watts Chem. Dict.
20. Calculated from theoretical.
21. Calculated from 10, 17, 19, 20, 27, 28, 2, 3, 5, 8.
22. Herz, Ber 31-2670; Seidell, Sol. of Chem. Subst.
23. Regnault, Landolt-Börnstein 771.
24. Schiff, Landolt-Börnstein 767.
25. Schiff, Physico-Chemical Tab. (Castell-Evans) 197.
26. Battelli, Landolt-Börnstein 770.
27. Wirtz, Smithsonian Phy. Tab. 214
28. Schiff, Physico-Chemical Tab. (Castell-Evans) 417.

Note: References are, in many cases, to the fundamental data from which constants were calculated, i.e., (2) refers to relative volume data. (10) was computed from vapor density, Molecular heat, etc.

per cent of the absorbing oil. Too high enrichment is likely to lead to loss of benzol and too low enrichment may involve needless consumption of absorbing oil. In European practice heavy tar oils are used almost exclusively as absorbing and steam media and such materials may find increasing application in America. Such tar oils should contain less than 7 per cent naphthalene and 90 per cent of the material should distil between 200 and 300 deg. cent.

Fig. 1 shows a flow sheet of a benzol plant showing the principal features of operation. Let us follow first the course of the gas and then that of the oil. Previous to treatment with the absorbing oil, the gas should be cooled to a suitable temperature, which may vary from plant to plant and depends principally upon such factors as its moisture and naphthalene content, temperature of the wash oil, and per cent enrichment desired. This cooling is accomplished by means of the cooler (A), which is preferably of the direct-contact type. The water not only acts as a cooling medium, but mechanically washes a large portion of the naphthalene out of the gas and carries it into the separating sump (B). The cool gas then passes into the benzol

washers (C). These are tall scrubbing towers of the hurdle type, effecting a very intimate and prolonged contact between gas and oil. The debenzolized gas passes out of the last washer through the return main to its point of consumption.

Enriched Wash Oil Accumulates in Tanks Underneath Scrubbers

The fresh wash oil is pumped from the circulating tank (D) over the scrubbers in an opposite direction to the flow of the gas, maintaining the counter current principle that should be adopted in nearly all scrubbing operations and bringing the fresh washing medium into the scrubbing system at a point where the gas contains the least light oil vapors. The distribution of the wash oil over the tops of the scrubbers is a very important matter and should be done as uniformly as possible. The enriched wash oil accumulates in tanks usually located underneath the scrubbers, and is pumped from these to the benzol recovery plant to be heated for the purpose of releasing its benzol constituents.

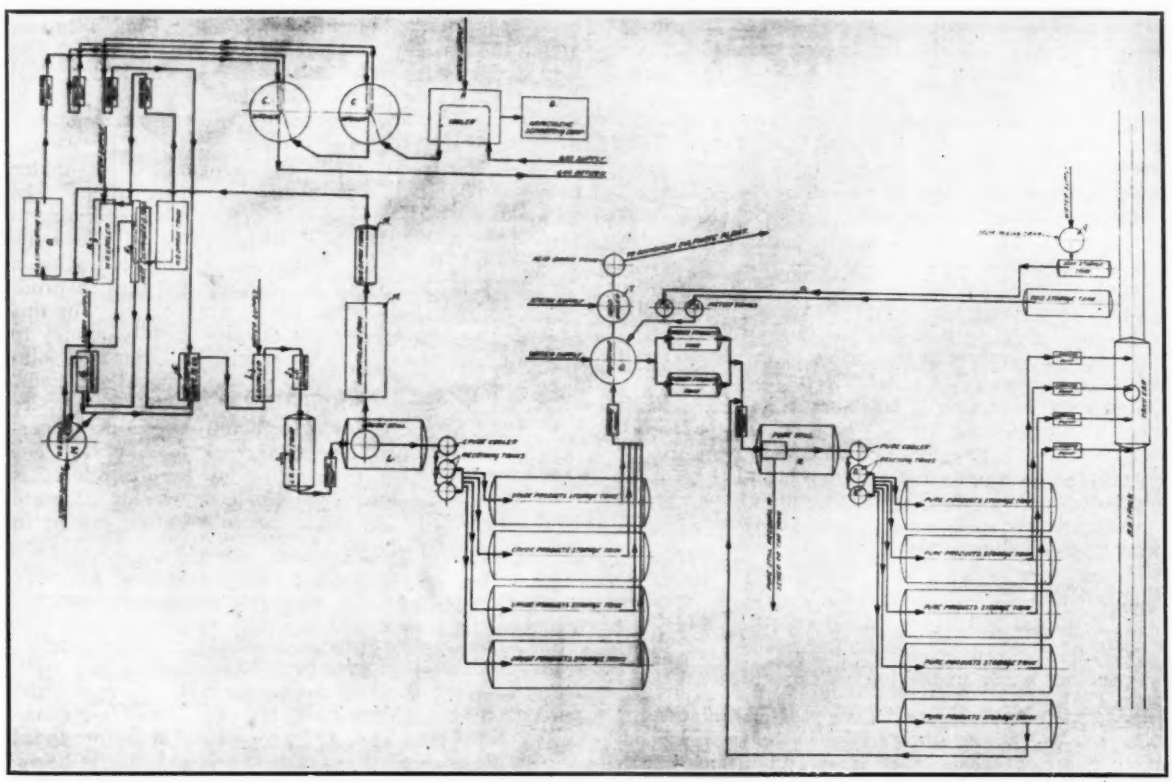
Part of this heating is accomplished in the Koppers system by the utilization of the heat in the hot debenzolized wash oil leaving the still. Two heat economizers are used in this system.

The cold oil first enters the heat exchanger (E), where it is heated by benzol vapors and steam from the still (H), thence it is conducted to a second heat exchanger (F), where it receives additional heating by means of hot debenzolized wash oil leaving the still (H). It is then still further heated to the maximum temperature desired by means of live steam in a superheater (G), from which it passes into still (H). This still is composed of a series of superimposed sections or chambers as in common distillation practice. The heated oil flows down through these sections while steam is blown directly into the lowest section and travels in a direction opposite to that of the oil. The mixture of benzol and water vapor is partially rectified in the upper portion of the still, and then enters the heat exchanger (E) as mentioned before, where it is condensed and the partial preheating of the enriched wash oil is effected. The remaining vapors are completely condensed and the total condensate cooled in a water-cooled condenser (I). The light oil is separated from the water in the condensate by means of the separator (J).

The debenzolized wash oil, after leaving the still, passes through the heat exchanger (F), where it gives up a part of its heat to the enriched wash oil, as stated above. Then it is finally cooled in the water cooler (K). The cool oil is then delivered to circulating tank (D), thus completing the cycle.

Recent Improvements Effect Marked Economy

The improvements that have been made in recent practice have to do principally with effecting as great economy as possible of heat in the cycle of gas treatment, distillation, and cooling, through which the wash oil passes. In the Koppers system it is calculated that the devices for heat economy reduce the steam consumption in distilling the enriched wash oil by more than 80 per cent. One thousand gallons enriched oil 77 to 284 deg. Fahr. (1,000 x 7.3 x .537 x 207) = 811,-



VARIOUS STEPS IN BENZOL RECOVERY PROCESS OUTLINED

440 B.t.u., = 840 lb. steam at full pressure, or, per 1,000 gal. purified benzols, 55 x 840 = 46,200 lb. of steam which, at 2 cents per 100 lb., costs $9.24; of this steam, heat exchanger (F), cooling the hot debenzolized oil from 275 to 170 deg. Fahr., in preheating the enriched oil, saves per 1,000 gal. enriched oil (973 gal. debenzolized oil), 973 x 7.3 x .54 x 105 = 402,675 B. t. u. = 417 lb. of steam or 49.8 per cent of the total; heat exchanger (E) heating the cold, enriched oil by the benzol vapors and steam from the still, adds a recovery of about 256,000 B. t. u. per 1,000 gal. wash oil, equivalent to 265 lb. of steam or 31.5 per cent. of the total; in the two heat exchangers, therefore, the total saving is 417 + 265 = 682 lb. of steam per 1,000 gal. of enriched wash oil circulated, or 37,510 lb. of steam for every 1,000 gal. of purified benzols produced, and the cost of steam for this purpose is reduced from $9.24 to $1.72 per 1,000 gal. of product.

Further economy lies in the saving of cooling water circulation which would be required to cool the debenzolized wash oil.

The light oil is accumulated in a drain tank (J) shown in the lower part of the figure, and portions are taken for distillation in still (L). This still is usually known as the crude still, the first distillation of the wash oil being made for the purpose of effecting an approximate separation of several fractions of different boiling points preliminary to washing and final rectification.

This and subsequent distillations are made intermittently in stills of large capacity (6,000 to 12,000 gal.), which give better fractionations than are possible in smaller apparatus. The continuous type of stills has not been found satisfactory in this work. The crude still does not require the elaborate dephlegmator that is necessary on the final rectifying stills. The heating is accomplished by means of internal steam coils and a direct steam spray. The benzol and toluol are principally distilled off by indirect heat, using the steam coils, and the higher boiling constituents, xylol, solvent naphtha, etc., are then distilled over by introducing steam directly into the still.

After the benzol, toluol, xylol and solvent naphtha have distilled off, a certain amount of wash oil containing naphthalene remains in the still tank. The presence of wash oil in the light oil is due not only to mechanical trapping of the heavy oil during the distillation, but also to the actual distillation of some of its original constituents by agency of the direct steam used.

The products recovered from 1,000 gal. of light oil vary, according to the kind of coal coked, the regulation of the ovens, and the method of operation of the light oil plant. In one plant that may be taken as fairly typical of a well-operated system, the yields average about as follows:

From 1,000 gallons crude light oil:

680 gallons crude benzol.
140 gallons crude toluol.
50 gallons crude xylol.
55 gallons solvent naphtha.
75 gallons wash oil residue with naphthalene.

The wash oil remaining in the still is drained into cooling pan (M), where it is cooled in the air to crystallize out the naphthalene. The wash oil is drained away from the latter into tank (N), and then is returned to the main circulating tank (D). In large plants where the amount of naphthalene is great, a centrifugal dryer is employed for the purpose of separating the small amount of oil remaining in the naphthalene, and also for reclaiming the naphthalene from the separating sump at the foot of the gas cooler. The crude naphthalene so obtained can be sold as such, or may be put into the tar in the coke plant.

Advisable to Accomplish Complete Purification of Product

The products obtained from the crude still will satisfy many commercial purposes in normal times. However, at present the demands of chemical manufacturers for benzol and toluol of a high degree of purity have made it advisable to accomplish the complete process of purification at the coke plant to serve this important part of the trade. For this purification the crude benzols are first washed with sulphuric acid and then with caustic soda and water. This operation is accomplished in agitator (O), which is a large lead-lined vessel with an efficient mechanical mixing device for bringing the acid and benzol into intimate contact. The acid is commercial concentrated sulphuric acid (66 deg. Bé). The quantity used is accurately measured from the motor tank (P_1). The caustic soda solution is prepared in the tank (Q) and measured in the meter tank (P_2).

The acid has the effect of reacting with, and to a large extent of polymerizing most of the impurities which consist of various olefines and substances of similar character, together with certain phenoloid bodies. This results in the formation of resinous substances of very high boiling point, part of which are insoluble in the benzols and settle out with the acid in the bottom of the agitator, while part go into solution, giving the benzol a dark brown or a reddish color. The acid sludge is drawn off and treated as will be described later. The caustic soda neutralizes any traces of acid which may remain in the agitator and effect the removal of some of the phenoloid bodies.

After the soda wash the benzol has a lighter brown color, but always requires distillation The washed benzol is delivered from the agitator to the still (R). This still is generally of the same capacity as the crude still, but is provided with a very efficient dephlegmator. Sometimes purified products of less exact boiling points are desired. In this case the washed benzols are distilled rapidly, simply to separate the benzol from the resinous materials in solution. The products so produced are termed "purified," e. g., 90 per cent. purified benzol, 50 per cent. pure benzol, etc., the nomenclature being based on the percentage in test distilling under 100 deg. cent. The distillation for the preparation of pure products is conducted more slowly, the condensate being collected in receivers (S), and tested carefully before placing in the final storage tanks.

Great Improvement Made in Recent Practice

Great improvement has been made in recent practice in the distillation of pure benzol and toluol. In a well-designed plant the cuts are remarkably clean and the percentage of intermediate fractions small. At one benzol plant pure benzene is regularly being produced of a grade such that less than 5 per cent. distils below 80.1 deg. cent. and 95 per cent. distils within 0.3 deg. cent. Pure toluene also is being made of which less

than 5 per cent. distils below 110 deg. cent. and 95 per cent. within 0.5 deg. cent. This extraordinary degree of purity is of great advantage to manufacturers of explosives and synthetic chemicals requiring the use of pure benzols. The ease with which these distillations can be effected and the sharpness of the cuts obtained is very remarkable. Much of the secret of success lies in the correct design of the dephlegmator. The record of one plant shows the following average figures for the distillation of crude benzol containing toluol:

Pure benzene	85.3 per cent.
Intermediates	3.4 per cent.
Pure toluene	9.8 per cent.
Residue	1.3 per cent.
Loss	0.2 per cent.

The residue is often allowed to go to waste, but may be mixed with the coke oven tar without injury.

Upkeep Cost of Plant Very Small

The water and caustic soda used in the agitator are drained to the sewer. The acid sludge drained from the agitator is delivered to a boiler (T), in which it is treated with direct steam. This effects a separation of the resinous materials in the form of a heavy carbonaceous spongy deposit. An acid of about 40°Be′ is recovered and may be used on the coke plant for making ammonium sulphate. The boiler is covered during the operation of steaming and the escaping vapors are condensed in a cooler.

Regarding other details, such as the arrangement of pumps, storage tanks and piping, the diagram is self-explanatory.

The upkeep of a benzol plant costs remarkably little, and the labor required in operation is small. A complete plant handling 5,000 gal. of light oil per 24 hours is operated by 5 men on day turn and 3 men on night turn, with 2 chemists for control testing and 3 laborers on day turn only for loading shipments and for general utility purposes.

The apparatus that is subjected to the most severe conditions is the superheaters. Spare superheaters should always be provided and the apparatus arranged so as to be readily interchanged. All apparatus for heating and cooling the wash oil should be so arranged that each individual unit can be taken out easily without disturbing the other apparatus.

All apparatus, with the exception of that exposed to sulphuric acid, is made of iron and steel, no special alloys being required. It is very essential that the utmost precaution be taken in the arrangement of the piping to obviate the possibility of accidental mixing of the different products.

Since benzol is a by-product of coke and gas making, those items in the cost of its production which are involved also in coke and gas production are not chargeable to the benzol. In other words, the cost of making coke oven benzol includes only the cost of its extraction from the coke oven gas, and that of its purification. This cost in the United States will vary according to local conditions, but usually lies between 4 and 7 cents per gallon.

Possibility of Competing with Gasolene as Motor Fuel

At the close of the European war, when prices again become normal, it will be possible with the large plant capacity then available, to make a substantial profit from the production and sale of automobile benzol (90 per cent. purified) at prices competing with those of gasolene. There are other large uses creating a demand for the various benzols, described in earlier paragraphs, and further uses will be developed as the supply of the material becomes greater.

The effect of the removal of benzol on the calorific value of the gas has been well worked out by J. W. Shaeffer, who recently published his results in an article —abstracted in American Gas Light Journal, page 431, Dec. 25, 1916—read before the October, 1916, meeting of the American Gas Institute. The actual loss in the calorific value of the gas amounts to about 5.8 per cent., which is a figure representing the average practice of about thirty by-product coke plants. The figure agrees well with theoretical considerations.

The result is that more gas has to be used for accomplishing a given heating effect. Assuming that one ton of coal makes 11,000 cu. ft. of gas, a reduction of 5.8 per cent. is equivalent to 638 cu. ft. less gas. As boiler fuel this gas is worth about six cents per 1,000 cu. ft., so that the reduction may be figured to cost about 3.83 cents per ton of coal, i. e., about 8 per cent. of the normal value (based on gasolene prices) of the total benzol recovered from a ton of coal.

Business Knowledge a Necessity to the Engineer

Engineering schools have developed satisfactorily, it may be said, the technique of engineering training. Engineering ability *per se* is not to be seriously criticized, but rather the marketing of that training in the public mart of twentieth-century demands, declared C. Francis Harding, professor of Electrical Engineering at Purdue University, in an address before the American Association of Engineers.

Coal of a very high heating value may be purchased at less than one dollar per ton at the mines. It is the placing of the coal under the boiler in the distant city that contributes most to the shock now associated with the average coal bill. The energy of falling water is thought to be a free gift of nature in the distant mountains, and so it is; but the competitive market in the metropolis finds the energy quite as dear as that produced from coal in the steam-turbine station.

It is the marketing process, therefore, that calls forth the capital to conserve the water power of the wilderness and to build the transmission lines over almost inaccessible territory.

The average young engineer of to-day fills all too well a closely analogous position. He has the latent technical ability, but lacks the wherewithal to provide that ability with the handle—business knowledge—which the layman, the business manager and the town council must necessarily grasp if the engineering profession is to be elevated to the position occupied in the public mind by the physician and lawyer.

It will be granted that the average engineer is technically well trained. Graduates of technical schools of recognized standing are rightfully assumed to be sufficiently familiar with the fundamentals underlying the branch of the profession in which they have decided to specialize. The employer and the public, however, justly demand more than this relatively small portion of the qualifications necessary for engineering success.

AMERICAN
GAS ENGINEERING JOURNAL

FIFTY-EIGHTH YEAR

Published Weekly by
AMERICAN GAS LIGHT JOURNAL, INC.
42 Pine Street, New York, N. Y.

ELBERT P. CALLENDER, President
STANTON G. KRAKE, Vice-President
FREDERICK A. SOUTHWORTH, Secy.-Treas.

EUGENE C. MILES, Editor

Subscription, $3.00 per year, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines.
In Canada, $4.00. Foreign, $5.00.

Entered at the Post Office, New York City, as Second Class Matter.

CONTENTS

GROOVED TRAP IN WHICH FOREIGN MATTER INVARIABLY ACCUMULATES ELIMINATED IN IMPROVED VALVES. BY D. E. KEPPELMANN.... 73

VARIOUS FACTORS INSURE CONTINUANCE OF LARGE MARKET FOR BENZOL AFTER EUROPEAN WAR HAS ENDED. BY F. W. SPERR, JR..... 77

EDITORIALS 84

GAS HEATED RIVETS RETAIN TEMPERATURE LONGER THAN DO THOSE HEATED IN OIL FURNACE.. 87

CARBON RESIDUE FROM OIL-GAS MANUFACTURE USED FOR EVERY PURPOSE FOR WHICH OIL IS UTILIZED 88

PATENTS PERTINENT TO GAS INDUSTRY..... 91

NEWS OF THE GAS INDUSTRY..... 93

PERSONAL NOTES..... 95

CONSTRUCTION NOTES..... 96

RECENT PATENT ISSUES..... 96

FINANCIAL NOTES WILL BE FOUND ON PAGE 16 OF THE ADVERTISING SECTION.

Keeping Down the Wage Limit in a Public Utility

In any business the employee deserves to receive from his employer a wage commensurate with his worth to him. It is but an act of justice and good business judgment to pay him such a wage.

There is a certain degree of logic in a manufacturer of steel beams, for instance, in keeping down the wage limit of employees. The money he selfishly gains thereby goes into his own pockets. There is no reason at all why a public utility should pursue a like course. What is saved to the company, unjustly, at the expense of the worker, but contributes in part to the low cost of production upon which a regulatory body will eventually fix a lower rate. Yet it is a regrettable truth that in the public utility field, as in other fields, there are to be found a large number of managers so lost to all sense of reason that their greatest worry seems to be lest, at some moment of mental aberration, they may pay some deserving employee a wage that is in some ways proportionate to his worth to his company.

We are glad to say that none of our large gas companies, and we hope but very few of our smaller companies, are guilty of such practice. That is but natural, however. Big companies must of necessity base their business policies on sound reasoning. Otherwise, they would not long continue being big companies.

This journal is an ardent advocate of low cost of production. It also views with enthusiasm each lowering of gas rates, provided such a lowering is made on a just basis, with a continued fair return to the gas company, plus an added allowance as a reward for the company's added efficiency, which alone can make such a lowering of rates just.

But it knows that such results are injurious rather than beneficial if made possible by inadequate wages paid to employees. They should be attained rather through alert and efficient management, through the foresight displayed by promptly discarding equipment that, when compared to later improvements, has grown obsolete, and through employees who work as if the interests of the company were their own interests, and to whom its prosperity is just as vital as is their own.

The Gas Man's Duty to His Journals—and to Himself

A careful analysis made by this journal, during the past year, of the information being supplied the gas man by the various periodicals in the field—this journal included—seemed to indicate quite clearly that the journals were not adequate to their field. Something was lacking.

It was realized that the industry is in a transition period; that developments and expansions have occurred during the past few years at a rate more rapid than in any other period of its history, and that the task of

the journals in keeping pace was a difficult one. But this did not answer the question, nor did it excuse the journals in any way. Frankly stated, the industry had forged ahead of its available literature—a situation which is the reverse of what should be the case. Unless the class journal can lead, suggest and mold opinion in its field, it fails to attain the greater part of its usefulness.

Further investigation indicated that the number of writers contributing to the gas journal are very limited, and that a very few writers were contributing the bulk of the signed articles published. Some of these writers were in no wise actively engaged in solving the problems of the gas industry.

Their function must necessarily have been that of a reporter with the weakness that they were not describing things they were familiar with, but things they had been told about. Consequently, there was a likely possibility that many factors were omitted that should, to accomplish the maximum usefulness, have been included.

A large proportion of the matter published in gas journals must necessarily be technical matter. A fiction writer may turn out millions of words, and yet not run out of material. His scope being fancy, his output is limitless. A technical writer can only tell what he has first learned or knows. There is a limit to his production. The consistent regularity of contribution of some of the gas-journal authors therefore lent the suspicion that, unconsciously, they were repeating things they had already told, which represents waste in many ways—waste of the reader's time, waste of the author's time and waste of space on the printed page, which could, with great profit to all concerned, have been devoted to other matters. The suggestion persisted that some of these authors had written themselves dry—that they no longer possessed anything new to tell about.

There can be no question that the only manner in which the gas journals can lead their field, and reflect the most advanced thought in it is through the active co-operation and assistance of the men who are actually working upon and solving its problems. Unless the rank and file of the gas industry will write about the work they are doing, the gas journals cannot possibly attain their maximum possible usefulness to the industry they serve.

The gas journals complain that it is difficult to get the gas man to write, and without question they have grounds for complaint. Whether this is due to a failure on the part of the journals to interest the gas man sufficiently in such work, or to impress upon him the vast importance of it to him and to his fellows, or whether it is due to an unsurmountable disinclination on the gas man's part for such work, is a factor aside from this discussion.

This journal believes that every journal serving the gas industry to-day is actuated by a high ideal of usefulness to the industry. Some, naturally, are succeeding in attaining that ideal to a greater extent than others, but they are all actuated by a common motive.

This matter of developing a wide range of contributors among those actively engaged in the work of the industry is of vital importance to all of them. It is of equal importance that the various associations should assist the journals in so doing. The gas industry has grown too large for the "word of mouth" method to be an efficient means for the interchange of information.

An Unemphasized Requisite for the Industrial Fuel Salesman

No more important problem is before the gas industry today than that of developing a large number of industrial fuel salesmen. We have confidence in the suitability of our product for industrial application, we are assured that—though there is admittedly much to be done along this line—we have sufficient efficient appliances to secure a much larger portion of the business than we now have, the tendency towards the heat unit standard is becoming universal throughout the country, and it is but a matter of time until we will have suitable rates.

In proportion to the amount available, however, we have not even begun to get the business. The number of successful industrial men we have enlisted today is so small that it would be no great task to locate every one of them, and it would not take much space on a page of the AMERICAN GAS ENGINEERING JOURNAL to publish each of their names.

That the industry appreciates the need of developing a large number of such men is evidenced by the great amount of thought and discussion that is being devoted to defining what sort of man the industrial salesman should be.

The consensus of opinion seems to be that the engineer-salesman is the ideal combination. But here the authorities seem to have encountered a snag. Too frequently we hear that this ideal combination is almost impossible to find. They then rush off into space, figuratively speaking, and strive to locate the next best type.

It is on this point that this journal is compelled to disagree. It *does not* by any means believe that it is impossible to find engineers with selling ability. Further, it believes there are a very large number of such engineers now engaged in other branches of the industry which do not offer one-tenth the opportunities for advancement that the industrial fuel branch does.

We have distinctly in mind a president of a large industrial corporation who is well known to the gas man and has been, to a large extent, active in his affairs. This man originally was an engineer. Destiny, or perhaps it was his own inclination, brought him into the selling end of the corporation he is now head of. This

man revealed a remarkable degree of aptitude as a salesman. It was not long before he became head of the most important subdivision of his company's selling force. The more extended field gave him an opportunity to reveal his real selling genius. Today the fact that he was once an engineer is frequently overlooked. If one inquires as to how he attained his present post, he will be informed that he was a " great salesman." We could likewise cite offhand a dozen engineers who are known now rather as salesmen, and who are making a splendid success of the work.

The delusion that any inherent selling ability the engineer may have possessed is killed by the nature of his training is a relic of a bygone age. The best kind of salesman to sell an engineering product is an engineer-salesman.

If the industry permits itself to be intimidated by the difficulty of obtaining this type—which it concedes is the ideal one for the work—and satisfies itself with the second best type, it will be seriously handicapped in its effort to develop the industrial gas field. It should not temporize, therefore, but decide upon the best method of locating those engineers in its ranks who possess selling ability and then try to enlist their efforts in this field, which for them, as well as for the industry, is a field of, practically speaking, limitless opportunity.

But before undertaking these efforts it should carefully consider that an engineering training and selling ability are the only prime requisites that the industrial man should possess. These are the requisites we most frequently hear about, but there is a third requisite which our speakers sometimes mention, but seldom emphasize—imagination; the ability of visualizing an installation that has perhaps never been made.

It is true that an engineering training and a knowledge of installations that have been made are necessary as a basis upon which to build the picture the industrial man's mind will devise, and selling ability is necessary to make the prospect see the proposed installation as clearly as he himself sees it, and appreciate its advantages. But without imagination, an engineering training and selling ability will not carry one very far in the industrial field. Its necessity as a factor in the make-up of the industrial man should be emphasized just as strongly as the latter factors, as it is, just as much as they are, a prime requisite.

An Interesting Coincidence

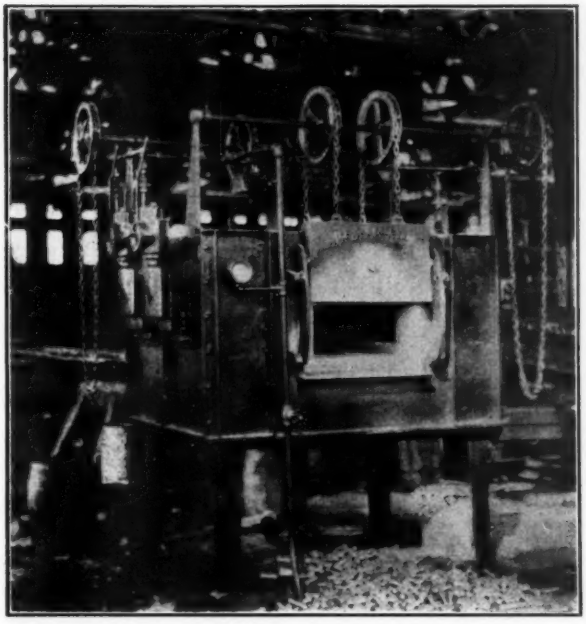
When the publishers of this journal, some weeks ago, decided to change its name from AMERICAN GAS LIGHT JOURNAL to AMERICAN GAS ENGINEERING JOURNAL—the old name, as has been stated before, seeming a misnomer in view of the range of subjects covered—the *Journal of Gas Lighting and Water Supply*, published in London, England, as a matter of course, entered considerably into the discussion. The two journals occupy, in a sense, very similar positions in their respective countries. Each has the age in its respective field, and each has a large group of readers, the product of its long life, who read it almost as a matter of habit. Each, likewise, has that element of sentimentality attached to it that cannot, with lightness, be ignored. A change of any kind in either must mean at least a moment of sadness, of regret, to many old friends. Once the decision was made to change the name of the AMERICAN GAS LIGHT JOURNAL, the thought of the *Journal of Gas Lighting and Water Supply* still forced its way into one's mind.

Since the change was made some of these old friends have called upon us, as we had expected they would, to voice their regrets. Momentarily, as we explained to them our reasons, which not only seemed to make the change logical, but inevitable as well, we expected them to cite the *Journal of Gas Lighting and Water Supply* as a refutation of our arguments.

Walton Clark, in his paper on the history of gas lighting, presented at the Baltimore Centenary, in discussing the claims of Murdock and Lebon as to which was the father of gas lighting, stated: "As is frequent with great discoveries and developments, people in different countries appeared to have the same idea about the same time."

We are not vain enough to consider our new name either in the light of a great discovery or a great development—though such action as changing the name of a journal which has served an industry more than half a century is not one lightly to be undertaken—yet, in a way, the analogy fits. In the issue of the *Journal of Gas Lighting and Water Supply* of Dec. 26, 1916, which came into the office of the AMERICAN GAS ENGINEERING JOURNAL Jan. 10, there is contained the announcement that hereafter it will be published as the *Gas Journal*, with an explanatory sub-title indicating the subjects which are covered and dealt with, namely—Light, Heat, Power, By-Products.

Thus, without any previous knowledge of the intention of the other, the two oldest gas journals printed in the English language, have changed the names they have carried since their establishment almost at the same time to titles that are more comprehensive and more truly an index to the subjects they cover. The coincidence may be carried even farther, if one will call but slightly upon his imagination. Though not worded exactly alike, the editorial explanations for the changes are so similar that one might say, if he has read that in the *Journal of Gas Lighting and Water Supply*, that he is familiar with the sense of that contained in the AMERICAN GAS ENGINEERING JOURNAL, and vice versa.



GAS FURNACE FOR HEATING RIVETS, SHOWING REAR DOOR FEATURE

Gas-Heated Rivets Retain Temperature Longer Than Do Those Heated in Oil Furnace

William F. Croston Explains Peculiar Condition Discovered at Works of Newport News Shipbuilding and Dry Dock Company

Though the fuel costs are greater and the time of run longer the Newport News Shipbuilding & Dry Dock Company prefers the gas furnace for heating rivets over the oil-fired type it formerly used, according to W. F. Croston, superintendent of the Gas Department of the Newport News & Hampton Railway, Gas & Electric Company in an article in the January *Bulletin* of the Southern Gas Association.

This furnace is a standard No. 35 oven furnace, as gotten out by the Surface Combustion Company, except that high pressure gas is used and a door is placed in the rear end of the furnace.

No blower is used, as the gas, with a pressure of 25 lb. draws in the proper amount of air for combustion. There are four burners, two on each side, each burning 250 cu. ft. per hour, a total of 1000 cu. ft. of gas per hour. The rivets are shovelled in the rear door of the furnace and are drawn out the front door as required.

A test was recently run to check the cost of operating by gas as against the oil furnace formerly in use. Four hundred pounds of rivets were heated in each furnace. These were heated by oil furnace in 44 minutes and by the gas furnace in 57 minutes. The cost of heating 400 lb. of rivets by oil with oil at 6 cents per gal. was 52½ cents. The cost of heating 400 lb. of rivets with the gas furnace with gas at 55 cents was 53.6 cents.

Both furnaces were hot at the start of the test and in each case rivets were drawn, ready to be used, four minutes after the charge was put in. The rivets heated in the gas furnace were far superior to those heated in the oil furnace, as there was practically no scale on them, while the oil heated rivets in some cases were badly scaled.

The Newport News Shipbuilding & Dry Dock Company are so pleased with the operation of the furnace that they have been using it continuously ever since.

After the furnace had been in operation for about two weeks the foreman in charge of the works made the assertion that the gas-heated rivets stayed hot enough to drive longer than those heated in the oil furnace. He was told that this was imagination but he was able to prove his assertion.

The only explanation that can be given for this peculiar fact is that the rivets heated in the surface combustion furnace are heated evenly all the way through while those heated in the oil furnace are extremely hot on the outside, but not hot in the center and thus cool more quickly than the gas-heated rivets.

The study of the operation of the furnace has demonstrated that, while the business can be held with this furnace, several improvements can be made which will give gas an even greater advantage than it now has. These include cutting down the sides of the combustion chamber, drawing the waste gases out through a hopper into which the rivets are charged, and one or two minor changes.

Supply Mantles and Burners Free to Increase Use of Incandescent Burners

English Company Inaugurates Innovation Which Proves Effective—Expects in Future to Supply All Gas Apparatus Free of Charge

The Scarborough Gas Company, in England, has announced that in the future it will supply and fix free of charge the best quality of upright or inverted mantles at about two cents each. If desired, consumers purchasing mantles at this price may fix them for themselves, but in certain cases the company reserves the right to fix mantles sold at this reduced price, or to make a charge of about seven cents per mantle.

Upright or inverted incandescent burners, complete with mantle and globe, will be supplied and fixed free of charge in place of existing flat-flame burners. When making this announcement the company says: "Incandescent burners give eight hours' brilliant light for two cents. They can now be freely used, as the cost of renewing mantles will be so small."

While the consumers seem to appreciate the company's enterprise, of which advantage is being extensively taken, the plumbers and gasfitters feel that the scheme will have a serious effect on their businesses. It has been decided by the local plumbers' association to call the members together, and in the meantime to make inquiries. It should, however, be mentioned that an official of the gas company has called upon the plumbers in the town, offering, so as to minimize their losses, to purchase their stocks of mantles at invoice price.

In the course of an interview with a representative of the *Scarborough Weekly Post,* reported in the *Journal of Gas Lighting & Water Supply,* A. Philip Allan, manager and secretary of the company, said that, though the cost to the company of each mantle was seven cents, the loss that would be incurred in their sale would be made good out of the profits derived from the production of benzol which is being extracted from the gas at the request of the government.

He pointed out that the dividend of the company is limited to five per cent., and therefore any additional profit is placed to the consumer. The company desires to popularize incandescent lighting and to give the consumer some return for the poorer quality of gas which is now necessarily being produced. With incandescent burners the consumers will, on the whole, get a better light with a poorer quality of gas.

On the point of the position of the local plumbers, Mr. Allan, judging by the quantity of mantles sold by the company, is of the opinion that their sales can only have represented a small percentage of the mantles used in the town in a year. With regard to the future, Mr. Allan said what he had in view was the supply of all gas apparatus free of charge and the reduction of the price of gas to the lowest possible limit.

Carbon Residue from Oil-Gas Manufacture Used for Every Purpose for Which Coal is Utilized

E. L. Hall Describes Process of Recovery in Use at Portland, Ore.—Smoke Occasioned by Drying Obviated by High Potential Electric Discharges

In the manufacture of illuminating gas from crude oils produced on the Pacific Coast, a quantity of very pure carbon is practically the only residue, stated E. L. Hall, chief engineer of the Portland (Ore.) Gas & Coke Company, in his paper on the new oil plant of that company, presented at the annual convention of the American Gas Institute. The amount of the carbon varies from 20 to 30 lb. per 1,000 ft. of gas made, or is equivalent to 2 to 3 lb. per gallon of crude oil used.

This carbon is deposited in a partly amorphous and partly graphitic form during the process of cleansing and washing the gas. It can be recovered in the wash water, which contains from 1 to 2 per cent by weight of lampblack.

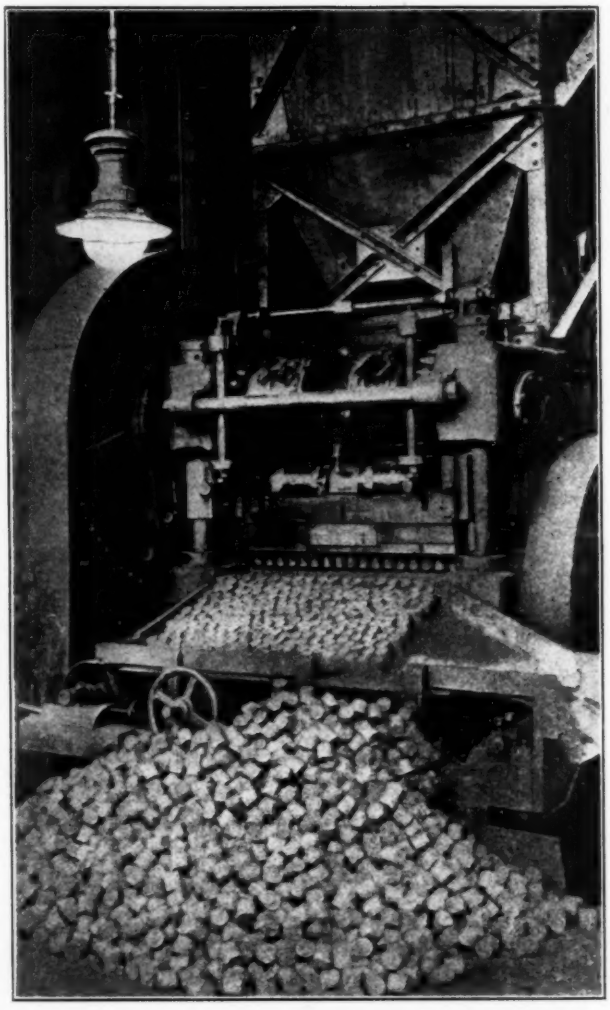
In early history of gas making, this carbon was allowed to settle out in large vats, whence it was shoveled out by hand labor. The art was subsequently improved by the use of filters, consisting of a rectangular tank containing the lampblack water, in which revolves a wooden cylinder, constructed in various sizes from 10 to 16 ft. in diameter, the axis of which is horizontal, and the two ends of which are open. The drum is constructed of fir or redwood staves which are pierced radially by pipes acting as spokes, which are in turn connected with a hollow trunnion.

The exterior of the cylinder is covered with wooden strips dividing the surface into sections, covered with galvanized iron mesh and several layers of burlap and duck canvas, the whole being tightly wound with galvanized wire wound on spirally with the strands about 1 in. apart. The trunnions are fitted with automatic valves, which alternately make contact with compressed air ports and vacuum ports, which communicate to tank receivers. These tanks are connected at the bottom to centrifugal water pumps, and at the top to ordinary vacuum pumps.

Operation.

The operation of the apparatus is as follows: That portion of the drum which is submerged is in communication with the vacuum ports. The suction draws through the canvas large quantities of water, leaving on the exterior of the canvas the suspended lampblack. As the drum emerges from the water, the vacuum connection is continued; but air penetrates through the lampblack and partially dries it. Then a further turning of the wheel breaks the connection with the vacuum ports and makes the connection with the compressed air ports, which happens just before the drum is about to submerge itself again. At this point the drum is in contact with a sheet-iron scraper, resting lightly on the surface of the wires. Through the combined action of the air blast and the scrapers the lampblack is removed from the surface of the drum.

There are four units of the type at the Portland Gas & Coke Company's plant, each 16 ft. in diameter, and having a capacity of 1,000 gal. of water per minute. The units are motor driven and placed two on each side of a 36-in. belt conveyor onto which the scrapers discharge. The belt conveyor passes immediately in front of two 50-ton rotary driers provided with worm feed and plow shaped scrapers resting on the conveyor belt.



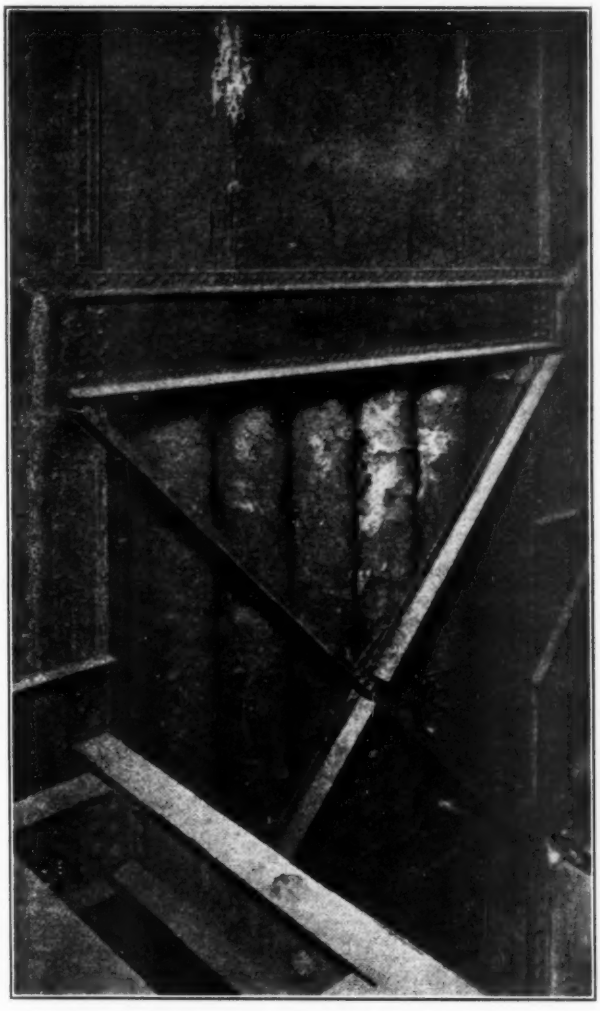
BRIQUETTE PRESS PRODUCING ABOUT 50 BRIQUETTES PER REVOLUTION

The vats which contain the lampblack water are made of reinforced concrete.

Driers-Feed into Bucket Elevator.

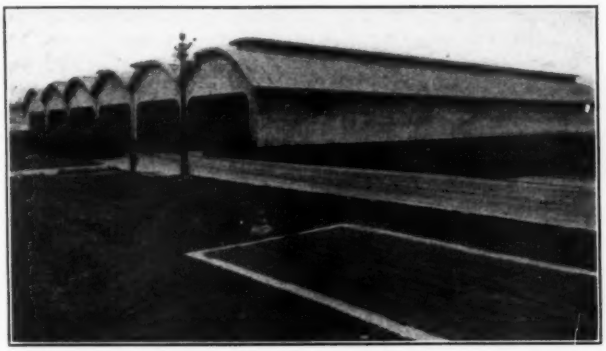
The driers are similar to rotary cement kilns. They are provided at the front, immediately under the feeds with Dutch-oven furnaces for firing with wood, and with 60-in. exhaust fans running at 900 r. p. m., handling about 12,000 ft. of air per minute, and connected likewise at the front of the drier, the front plate of which makes a sliding contact with the drum. The drum is set on a slight incline, and the progress of the lampblack is from front to rear, where it is discharged by gravity. The path of the fuel gas is under and around the drums, entering at the rear and passing through the drum into the fan duct at the front.

Both driers feed into a single bucket elevator, discharging into an overhead hopper, which is supported directly on the frame work of a 50-mould briquette press, designed especially for the briquetting of lampblack. The press operates at about 7 r. p. m., producing about 50 briquettes per revolution.



SMOKE-TREATER USING HIGH POTENTIAL ELECTRICAL DISCHARGES

The press consists of a bronze mould board containing 50 moulds, 2¼ in. in diameter, which is fitted to receive top and bottom plungers actuated by cams and connected by means of a set of gears and clutch to a 35 h. p. motor. Compression of briquettes is by means of simultaneous action of top and bottom plungers. The filling and discharge of the moulds is accomplished by



BRIQUETTE STORAGE SHEDS

means of a reciprocating horizontal mould board, continuously fed with lampblack from the overhead hopper.

The briquettes as produced are discharged immediately onto a short rubber belt conveyor, gear driven from the press itself, and discharging onto a system of unit conveyors for the purpose of storage.

They consist of 12 sectional conveyors, each equipped with its individual motor, and overlapping end to end. The last one in series is known as a stacker, and consists of a belt conveyor operated at a steep angle, and which may be lowered or raised or moved from side to side as desired.

The process of briquetting is as follows: The lampblack as recovered on the wheel is dried to a percentage varying from 45 to 52 per cent of moisture. The material as continuously recovered on the wheel is dried to a percentage varying from gas plant, there being no storage provided for the carbon water; in other words, the carbon water is treated as fast as the gas is made.

The gas works has a present capacity of 50 to 75 tons of carbon per day. This quantity is continuously discharged onto either one or two driers and dried to a moisture content of from 12 to 15 per cent. No binder is used, since the volatile matter naturally present in lampblack, which is of a tarry nature, is sufficient for this purpose.

Continuous Process.

The drying, unfortunately, is accompanied by a certain amount of yellow smoke, consisting mainly of hydrocarbons of a tarry nature. This smoke is of a very persistent nature, and at one time brought complaints from adjoining property owners. The smoke is not susceptible to being treated or washed in a similar manner as chemical fumes, since it is not soluble and is present in a vesicular or fog form. After considerable experimentation, the problem of obviating this nuisance was accomplished by treating the smoke by high potential electric discharges, in a similar manner as the Cottrell process used in treating smelter fumes. But little power is required for this purpose, and the results are remarkable.

The dried lampblack is continuously discharged from the conveyors and continuously briquetted. The hopper over the press has a storage capacity equal to about 1 hour's run, which is sufficient for the ordinary attention to the press. The briquettes produced are cylindrical in form and 2¼ in. high. They are quite hard and will bear considerable handling. Owing to the irregularities of operation, etc., there is at times considerable dust produced, and for this reason, all briquettes are screened before selling. Inasmuch as the briquettes are pressed with a very low percentage of moisture, extensive drying or curing is not needed before selling, a couple of weeks being ample time for this purpose, at which time the moisture content has been reduced by evaporation to 5 or 8 per cent.

Same Price as Coal

Briquettes are at present delivered by trucks to all parts of Portland, and, inasmuch as the gas plant is located about 7 miles down the Willamette River from the center of the city, the expense for transportation is quite an item. The briquettes are sold on a sliding scale, ranging from $7 to $9.50 per ton, with a 50 cent reduction in the summer months. They are used for all purposes that coal is utilized, including domestic use and steam raising in apartment houses.

Gas, for Public Lighting, Gains in Massachusetts

According to figures to be published in the thirty-second annual report of the Gas & Electric Light Commissioners of Massachusetts, covering the year which closed July 1, 1916, gas as a street illuminant more than holds its own in the cities and towns of the commonwealth which have that type of public lighting installed. The following are the number, price and expense of care for the street lighting units on June 30, 1915, and on the same date of 1916:

	Number of Lamps.		Price per M, incl. Expense.		Expense Care, per M. Lighting and for Gas.	
Boston.....	10,002	10,021	$0.667	$0.0662	$0.019	$0.026
Cambridge	305	305	1.378	2.03	.622	1.162
Quincy	282	336	1.199	1.198	.262	.278
E. Boston	943	932	.654	.988	.017	.014
Fall River	449	444	.80	.80	...	...
Gardner	104	93	1.086	.865	.538	.411
Gloucester	116	116	1.00	1.00	...	...
Haverhill	583	601	1.777	1.75	.924	.92
Lowell	1,543	1,559	1.848	1.83	1.116	1.11
New Bedford...	1,188	1,196	1.933	1.83	1.15	1.067
Newton	1,077	1,085	1.48	1.58	.605	.636
Worcester	583	628	.75	.75	...	...

292,300,000 Barrels of Crude Petroleum Marketed in 1916

Preliminary estimates by John D. Northrop, of the United States Geological Survey, indicate that the quantity of crude petroleum produced and marketed in the oil fields of the United States in 1916 was 292,300,000 barrels. This quantity is greater by 4 per cent than the corresponding output in 1915, which reached the record-breaking total of 281,104,104 barrels. Mr. Northrop estimates that 38 per cent of the 1916 total came from the Oklahoma-Kansas field, 30 per cent from California, and the remaining 32 per cent from the Appalachian, Lima-Indiana, Illinois, North Texas, North Louisiana, Gulf Coast, and Rocky Mountain fields.

Increasing Use of Coke for Boiler Fuel in England

An order for 8 coke-burning mechanical stokers for use under the steam boilers at the Greenwich generating station in London, England, was recently awarded by the London County Council. The maximum consumption capacity of the 8 stokers is estimated at 100 tons of coke per 24 hours. The present consumption at the power station has been put at 165,000 tons per year.

The London Coke Committee has pointed out that, in view of the huge surplus of coke available in London before the war, the financial advantages which should accrue to the Council by equipping the boilers with stokers, which open the door to this alternative source of fuel supply, should be considerable, while from a national point of view the advantages accruing from the policy of using coke instead of coal to the extent indicated are no less important and far-reaching in their incidence in view of the abnormal and increasing cost of imported raw materials used in the manufacture of carbureted water gas. Based upon the total yearly consumption, which is by no means the largest of any individual power station in London, the valuable residuals which would be recovered by diverting this quantity of coal through the gas works would include 1650 tons of sulphate of ammonia, 300 tons of high-explosive material, and 1,650,000 gal. of coal tar.

1916 Greatest Coal-Producing Year

Coal production records were smashed in 1916, when the output was around 597,500,000 tons, compared with 570,000,000 tons, the previous high record established in 1913. The quantity of bituminous coal mined was 509,000,000 tons, an increase compared with 1915 of 66,500,000 tons, or 15 per cent, according to estimates of the United States Geological Survey. The quantity of Pennsylvania anthracite was about 88,312,000 net tons, a decrease of 600,000 tons.

The Engineer's Relation to Society

Somewhere behind every human problem lies the work of the engineer, declared Ira N. Hollis, president of Worcester Polytechnic Institute and recently elected president of the American Society of Mechanical Engineers, in his brief address at the last annual meeting of that society.

Our country affords a perfect example of this in its evolution from a few colonies, with imperfect means of communication, into the United States of America. A history of the great inventions and the changes wrought by the applications of science will some day reveal the potent influence of our profession upon every department of national life.

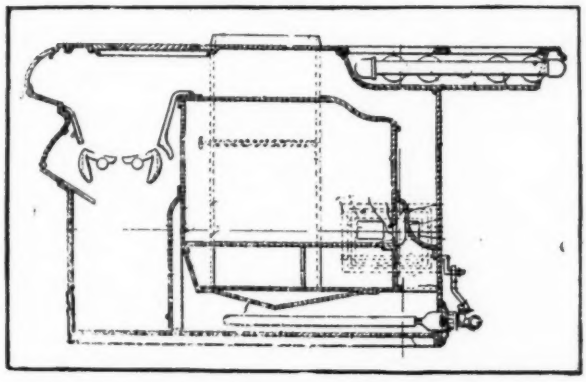
What made the great slave-holding states possible? The cotton gin.

What, therefore, created the whole atmosphere of political discussion during the sixty years of the nineteenth century and finally plunged us into a great war? The cotton gin.

What again saved the Union and welded it into one country from coast to coast? The railroads.

We can name few of the questions before Congress that do not in origin or in their solution depend in some way upon the engineer.

Patents Pertinent to Gas Industry



DAMPER OPERATES SIMULTANEOUSLY WITH GAS COCK

Range Gas Cock Controlling Oven Burners Also Operates Damper Between Oven and Exhaust Flue

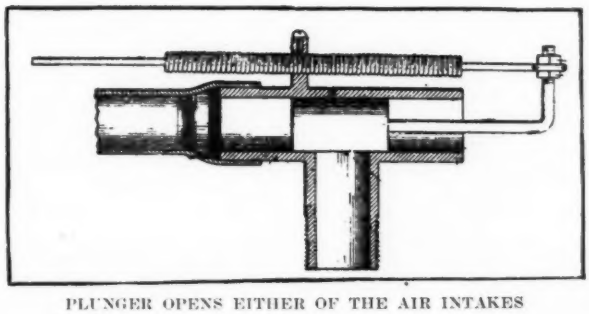
Patent No. 1,208,314; described in Patent Office *Gazette*, 12-12-16, page 578. George E. Heidbreder, Quincy, Ill. Filed Sept. 14, 1916. Serial No. 120,124. (Cl. 126-36.)

In this combination coal and gas range the oven burners are in a space underneath the flue conveying the heated products from the coal fire to the bottom of the oven. Separate flues connect the burner space with the oven and a deflector plate deflects the heat from the burner to these flues at the opposite ends of the oven. A damper is inserted between the oven and the main exhaust flue and is attached to the gas cock so that it is operated simultaneously with the gas cock.

Either Heated or Cold Air May Be Admitted to Internal Combustion Engine by This Device

Patent No. 1,208,598; described in Patent Office *Gazette*, 12-12-16, page 678. John Clinton Mackey, New York, N. Y., assignor, by direct and mesne assignments, to the Mackey-Reusing Gas Saver Company of Ohio. Filed Oct. 15, 1914. Serial No. 866,835. (Cl. 48-180.)

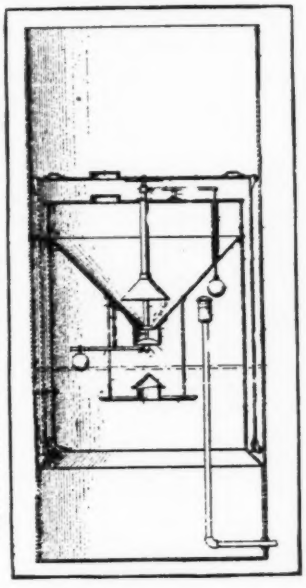
This device consists of a tee fitting with the branch connected to the intake manifold of the engine. One end of the run is open to the atmosphere and the other is open to the heated air supply. A plunger operated in the run of the fitting closes or opens either of the air intakes as may be desired.



PLUNGER OPENS EITHER OF THE AIR INTAKES

Acetylene Gas Generator and Holder Contained in One Casing

Patent No. 1,208,412; described in Patent Office *Gazette*, 12-12-16, page 613. Charles P. Vernier, Cedar Rapids, Iowa. Filed Oct. 29, 1915. Serial No. 58,646. (Cl. 48-53.1.)



This acetylene gas generator consists of an outer casing having water therein, an inner lining, and a small gas holder operating between the outer and inner casings. The carbide tank is in the top of the inner lining, and a perforated pan to hold the carbide while generating the gas is placed below the tank and underneath the water. A system of valves controls the feeding of the carbide and the generated gas to the holder.

Gas Burners Equipped with Radial Ports

Patent No. 1,207,926; described in Patent Office *Gazette*, 12-12-16, page 439. Regina Kahn, Milwaukee, Wisconsin. Filed Sept. 23, 1912. Serial No. 721,762. (Cl. 158-115.)

At the top of the vertical pipe a number of radial holes are tapped, and a pair of discs arranged to cover these holes. These discs may be moved nearer together or farther apart. A pilot pipe is run from the main supply pipe to between the two discs.

Lantern Burns Either Acetylene Gas or Oil

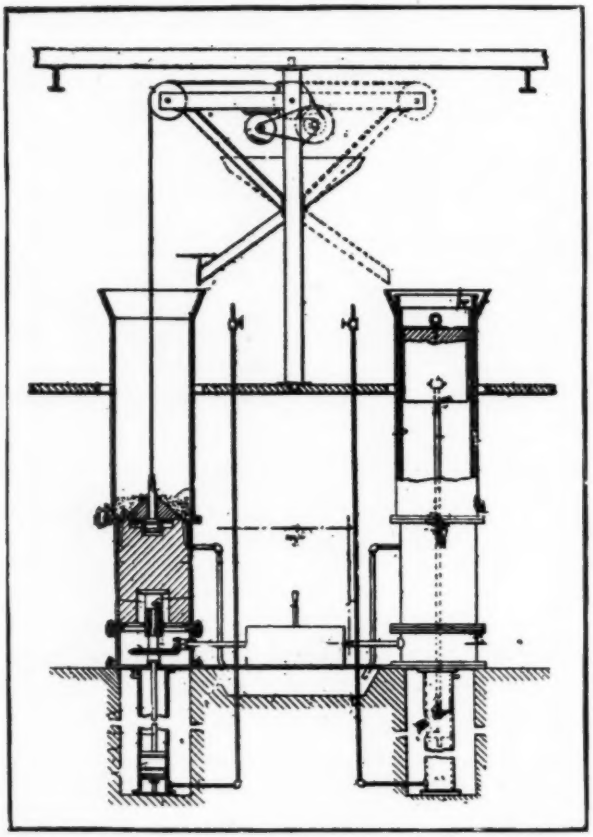
Patent No. 1,208,059; described in Patent Office *Gazette*, 12-12-16, page 484. Roy C. J. Welch and Stanley L. Sweeney, Port Coquitlam, British Columbia, Canada. Filed Jan. 11, 1916. Serial No. 71,569. (Cl. 240-37.)

The carbide holder is in the lower portion of the lantern, and the water container in the upper portion. A tube conveys the water from the water container to the carbide, and the gas is conveyed through a pipe which passes through the water container. The burner is fitted into the upper end of the pipe. When it is desired to use oil in the lantern the tube is removed and an oil reservoir is placed in the carbide holder, the water container is removed and a wick burner inserted in its place.

Pipe Moulding Machine Operates by Compressed Air

Patent No. 1,208,107; described in Patent Office *Gazette*, 12-12-16, page 501. James B. Davie, Brooklyn, N. Y. Filed Feb. 24, 1916. Serial No. 80,105. (Cl. 22-18.)

The apparatus is made up of a cylindrical flask and inside of the flask is a cylindrical pattern of smaller diameter than the flask. Connected to the bottom of the pattern is a piston rod, which is in turn connected with a piston, this piston being raised or lowered by the admission of air, care being taken that the air does not escape from beneath the piston. Means are provided for rotating the piston rod and pattern while they are being raised or lowered, the uniform distribution of sand between the pattern and the flask being assured. A back wash plug may also be attached to the piston and passed through the flask.

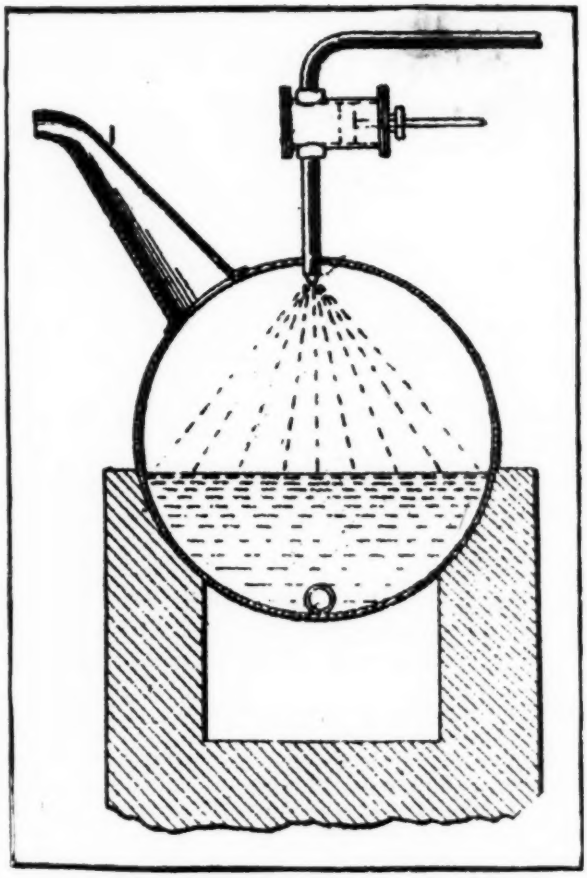


MEANS PROVIDED FOR ROTATING PISTON AND PATTERN

Crude Petroleum or Heavy Distillates of Petroleum Converted into Lighter Products in New Process

Patent No. 1,208,378; described in Patent Office *Gazette*, 12-12-16, page 601. Pedro Roth and Maximo Eduardo Venturino, Buenos Aires, Argentina. Filed Oct. 16, 1916. Serial No. 126,057. (Cl. 196-25.)

The process consists of heating either crude petroleum or the heavy or middle distillates in the still to a temperature which, in the first case, produces cracking and vaporization of a considerable proportion of the ingredients, or in the second case which is above the boiling point of the hydrocarbons to be cracked. Undiluted petroleum distillates are then introduced into the still in the form of a spray so that a portion of the sprayed petroleum is vaporized in the vapor space in the still, the remainder of the volatilization taking place when the sprayed petroleum comes into contact with the liquid residuals remaining in the still.



UNDILUTED DISTILLATES INTRODUCED INTO STILL IN FORM OF SPRAY

Consignee Cannot Refuse to Receive Shipment Injured in Transit if Damage is Only Partial

The North Carolina Supreme Court recently held in a suit against a railroad company for injury to mill machinery while in transit that a consignee is not entitled to refuse to receive a shipment, as against the railroad company, merely because it has been damaged, where the damage is only partial, and subject to repair. He cannot reject the freight and recover its full value, but must accept it, and make claim for the amount of damage done, if the injury is one for which the carrier is liable. The damages recoverable in such case are the excess of the value of the machinery in an uninjured condition above its value in its actual condition on arrival.

News of the Gas Industry

New Shut-Off Invention Shown at Meeting

The Pittsfield Gas Company's Employees' Association had a most interesting meeting recently. A newly invented shut-off valve was shown in actual operation. The valve is the invention of George R. Nixon, superintendent of the distribution department of the Pittsfield Coal Gas Company of Pittsfield, Mass. A patent for the same has been applied for.

In case of fire it is often desirable to shut off the gas supply from the outside of a building rather than from the ordinary valve in the cellar. By means of the new valve this result can readily be obtained. The members present discussed the valve and its operation and were unanimous in declaring it a big improvement over anything now in use. It is simple in construction and operation and apparently cannot fail to work.

Earlier in the evening a business session of the association was held. At this time candidates were nominated for the March election. Refreshments were served at the conclusion of the meeting.

$5,000,000 Company Organized at Portland, Me.

With an authorized capital of $5,000,000 the Sinclair Gulf Oil Company was organized recently at the Corporation Trust Company in Portland, Me., the corporation being formed to engage in a general oil producing and refining business. Nothing is paid in on the capital stock. T. L. Croteau is president, A. B. Farnham, treasurer, and these with George S. Soule are the directors.

Rich Well Struck in Carter County, Ky.

What appeared to be the best gas well ever struck in eastern Kentucky was brought in at Denton, Carter County, on Jan. 4. The flow was so strong that it threw mud and water over the top of an eighty-foot derrick. There was no decrease in the pressure that afternoon. An experienced driller has been unable to control it.

Fire in the boiler was extinguished to prevent the gas igniting. It is estimated that the well will produce 6,000,000 cu. ft. of gas in twenty-four hours.

The well was drilled by Burdette & Murphy, of Ashland, Ky., and was their first effort. They have a large territory immediately surrounding the well and others will be commenced at once. The Kentucky Gas & Oil Company and the Little Sandy Oil & Gas Company each have large holdings near this place and it is understood that they will begin drilling just as soon as machinery can be secured.

Advertising Campaigns at Chicago, Ill.

The People's Gas Light & Coke Company of Chicago, Ill., has to its credit a long list of really successful newspaper advertising campaigns. One of the more recent ads shown above with the title of "The Fire of an Opal," is typical of the good copy which has been produced by them. It deals with only one article in one department, but in an interesting and gripping manner which insures complete reading. Its logic does the clinching.

THE FIRE OF AN OPAL
is only a figure of speech. There is water, but no fire in an opal, but everyone is familiar with its beautiful livelike reflections.
Can you imagine an opal fifteen by ten inches radiating real heat?
If you have never seen a Humphrey Radiantfire, this is as near as we can come to describing it to you. It bears no resemblance to a gas log, or any other kind of gas grate. The Humphrey Radiantfire is an entirely new and original idea in heat radiation, and consists of a series of hollow porcelain tubes. Gas is introduced into these tubes through a bunsen burner, and when it is ignited this battery of tubes immediately becomes a glowing, incandescent mass. It consumes only a small amount of gas but radiates tremendous heat waves.
The air currents playing on this heat mass produce constantly changing colors, most fascinating to watch and comparable only to a gigantic opal.
THE HUMPHREY RADIANTFIRE
The Humphrey Radiantfire is a flameless, odorless, noiseless gas grate equipment, capable of projecting heat waves which are easily perceptible at eighteen or twenty feet away from the fire. It is as effective as it is beautiful.
While it is a valuable adjunct to a millionaire's mansion, its cost is within reach of persons with moderate incomes, and it is quite inexpensive to operate. It has all the genial attraction of a wood or cannel coal fire without the dirt and bother, and can be operated at less expense.
To convince yourself of the absolute novelty and extraordinary fascination of a Humphrey Radiantfire, visit our big basement salesroom in our downtown office and see one in operation, or if that is not convenient send us a postal card or phone Wabash 6000 and we will send one of our house heating experts to further inform you. Address: "Home Heating Department."
THE PEOPLES GAS LIGHT & COKE COMPANY
PEOPLES GAS BUILDING WABASH 6000

ATTRACTIVE ADVERTISEMENT APPEARING IN CHICAGO PAPERS

Another advertisement is entitled "Don't Shoot It—There's a Better Way," illustrated by a man about to shoot an old flat flame burner with a fully loaded pistol. The punch of such phrases as "Flat flame criminals," "Take a farewell look at your flat flame burners and 'phone now," have really brought results in the Mantle Light Department.

Another campaign is well spoken of by S. C. Pratt[illegible] and G. D. Mantle in a paper entitled "Up-to-the-Minute Selling Method[illegible] presented" at the twenty-fourth annual [illegible]ion of the Pacific Coast Gas Asso[illegible]on, as follows: "The second examp[illegible] of effective 'Good-Will Advertising' is the series of advertisements of the People's Gas Light & Coke Company in the Chicago dailies. Everyone who reads them is bound to believe that the proposed change from a candle power to heat unit basis is in the interest of the consumer—a belief which we can scarcely conceive an uninitiated public would otherwise entertain it."

Moving Pictures Will Show Operation of By-Product Coking Plant

C. J. Ramsburg, vice-president of the H. Koppers Company, builders of By-Product Coke and Gas Plants, Tar Distilling Plants, Ammonia Recovery Plants and Benzol Recovery Plants, of Pittsburgh, Pa., will discuss by-product coking plants before the Franklin Institute, Philadelphia, Feb. 1. Mr. Ramsburg's address will be illustrated by a moving picture film showing the operation of a by-product plant, and lantern slides.

Another C E-Z Campaign

A better lighting campaign was recently waged in Dubuque, Ia., by the Key City Gas Company, the result of which has been that scores of gas users are enjoying incandescent gas lighting that brings remarkable light to all parts of the room.

"See Easy" is the slogan that has been adopted, and C E-Z is the name of the new light made by the Welsbach Company which was pushed in Dubuque. The lights were demonstrated in homes without cost or obligation and sold on easy term payments.

Meeting of Industrial Fuel Men

After a conference between Mr. C. E. Chapple, chairman of the Industrial Fuel Committee of the National Commercial Gas Association, and Mr. I. Lundgaard, chairman of the Fuel Appliance Committee of the American Gas Institute, it has been decided to call a meeting to be held at the Auditorium of the Consolidated Gas Company's Building, 130 East Fifteenth Street, New York, Friday, Jan. 26, of industrial men throughout the country, the purpose of this meeting being to secure the active co-operation of all these men in some well developed plans for the development of the industrial fuel business, and the solving of the many problems that gas companies have to meet.

The contemplated program is as follows: Continuation of series of Industrial Fuel Reference Books.

Compilation and publishing of specific test data covering industrial installations along the lines outlined at the meeting in Atlantic City Nov. 16, 1916.

Development of a possible plan of co-operation between gas companies and technical schools and universities throughout the country whereby there will be established courses having a more direct bearing on the needs of the gas industry

for industrial fuel salesmen and engineers.

Co-operation by means of a joint committee consisting of members of the Fuel Appliance Committee of the American Gas Institute, the N. C. G. A. Industrial Fuel Committee and representatives of industrial fuel appliance manufacturers, to start the work of standardizing industrial appliances.

Co-operation with industrial appliance manufacturers to keep all those interested informed as to the development of new fields of work.

Massachusetts Companies Feature Radio-X Lights

A phenomenal sale of the Radio-X gas lighting units has been made in companies operated by the Gas & Electric Improvement Company, Boston. During one week 1,200 lights were sold at Gloucester, while at Northampton nearly a thousand were disposed of.

A campaign on the Radio-X has just been completed by the Milford (Mass.) Gas Light Company.

Coal Embargo Makes Gas Situation Serious

When the embargoes went into effect, Jan 4. stopping coal shipments westward from the mines at Elizabeth, Pa., and Sturgis, Ky., the question of gas became serious at Springfield, Ill., which depends wholly upon the coal mines in these two places for her supply of gas coal.

The reserve supply of the gas company had been reduced to one-third its normal size, one thousand tons, which General Manager A. D. Mackie said would be sufficient only for three weeks more. Until recently a reserve of 4,000 tons was always available.

As soon as the danger to the gas supply became imminent, W. H. Conkling, secretary of the Springfield Commercial Association, telegraphed the commerce commission, asking that there be no curtailment in gas coal shipments, lest there be "untold suffering among our people." The commission acknowledged the receipt of the telegram, but no indication of action on the request was given. The telegram follows:

"Interstate Commerce Commission,

"Washington, D. C.

"We are informed that an embargo on coal shipments west goes into effect at Elizabeth, Pa., and Sturgis, Ky. As all gas coal used by our local gas company is shipped from these points, such action will very materially and dangerously affect the operation of the company supplying gas to Springfield, Ill., with its population of sixty thousand. We are informed that the consumption of coal by the local company has exceeded shipments received during the last few weeks, that their reserve stock is now about nineteen hundred tons, and that they should have on hand at least three thousand tons to insure against shutting down the plant. Majority of the people of Springfield depend entirely on gas for cooking and lighting, as well as an extentive use in manufacturing district, and should any interruption occur to the gas supply it would mean untold suffering among our people. Your honorable body is therefore urgently requested to instruct railroads to give gas coal shipments precedence and that there be no curtailment in the furnishing them with cars for both loading and delivery of coal.

"Springfield Commercial Association,

"W. H. Conkling, Secretary."

Urges Abolition of Boston Sliding Scale

Presentation of a bill in the Massachusetts Legislature to abolish the Boston sliding scale gas system—a measure which is aimed to secure a reduction in the price of gas in Boston and Brookline—has drawn the attention of the legislators to the opposition of the State Board of Gas and Electric Light Commissioners to the sliding scale system. This opposition was expressed not only in the report to last year's Legislature, in which the board recommended that the sliding scale be abolished unless the Boston Consolidated Gas Company dissolved its association in affiliated companies, but also in the original report on the subject before the system was accepted 10 years ago.

The recommendation is made that the "sliding scale" law as a substitute for the regulatory power vested in the commission in its relations with other gas and electric companies, be repealed unless the Boston Consolidated is entirely disassociated from the Massachusetts Gas Companies, and its stock distributed directly among investors.

New Gas Office Opened in Kansas City

Offices were leased at Kansas City, Mo., in the Commerce Building recently, by the Empire Gas & Fuel Company, controlled by the Doherty interests. The firm is owned by the Cities Service Company. A number of engineers and other men in the company's employ will come to Kansas City to make their headquarters here. Ralph Morrison, a newspaper man, will have charge of the office.

Henry L. Doherty stated that as soon as the gas problem reaches a settlement he will establish offices for the parent concern, Henry L. Doherty & Company.

The Empire Gas & Fuel Company is capitalized at $7,500,000.

Newport Gas Light Company Elects Directors

At the annual meeting of the stockholders of the Newport Gas LightCompany of Newport, R. I., the following directors were elected: Andrew K. Quinn, Packer Braman, Henry C. Anthony, Clark Burdick, Edward A. Sherman. The directors later elected Andrew K. Quinn president and Packer Braman secretary.

Gas Furnace for Another Boston Paper

Another Boston newspaper, the *Evening Record*, has adopted gas for metal heating and stereotype work, making three newspaper companies which have discarded coal in favor of gas during the past few weeks.

The other papers are the *Globe* and *American*.

The Boston Consolidated Gas Company is making noteworthy strides in its industrial fuel business.

Remarkable Growth of Beverly Gas and Electric Company Told in Anniversary Review

To mark the passing of its thirtieth anniversary under its present management, the Beverly Gas & Electric Company, of Beverly, Mass., has issued for its stockholders a most interesting review of the history of the company, illustrated with pictures of the plant and office buildings, office and officials of the company—a souvenir that is most complete and one which teems with facts and figures showing the progress the company has made until to-day it has one of the best plants of any city of its size in the country and has a reputation of being one of the most efficently managed public service corporations in the State.

Fifty-eight years ago on June 4 the company was organized with a capital of $40,000 and organization was perfected with John B. Hill as clerk and treasurer, John I. Baker, W. R. L. Ward, Charles Smead and John Meacom and Isaac Appleton, directors. On that same day the directors organized with John I. Baker as president and the president was authorized to execute a contract with W. R. L. Ward and Charles Smead for the erection of a gas works with not less than two miles of main pipe and services at a cost not to exceed $40,000 payable in stock of the company. The work was completed and the plant was accepted on Oct. 21, 1860. Charles Smead was named as superintendent of the company at the meeting of the directors held on that day. The directors met on July 19 and John I. Baker elected as president. The most important business was the vote to fix the price of gas at $5 a thousand feet with a discount of five per cent. if bills were paid within seven days after presentation. The office of the company was then located at the store of Mr. Hill at 160 Cabot Street, the store is still continued by John F. Hill at the same location.

When the present management took over the company the total assets were $52,656.40. The assessed valuation of the plant was $15,750 and the tax bill for the year amounted to $205.91. There were six miles of gas mains and there were 318 meters in use. Gas was sold at $3.25 gross per thousand feet with a net price of $2 and there were 4,098,000 ft. of gas sold in the year.

The present management assumed direction of the company at the annual

meeting held on July 20, 1886. Andrew W. Rogers was elected clerk and treasurr, John I. Baker, Charles F. Prichard, Sidney W. Winslow, Dennis W. Quill and A. W. Rogers were elected directors. A vote of thanks was accorded the retiring officers John B. Hill, clerk and treasurer William R. Endicott, Octavius Howe, Isaac Appleton and W. R. L. Ward directors. The same day John I. Baker, who had been president of the company for twenty-six years was re-elected as president.

The company on April 11, 1888, petitioned the gas commissioners for authority to engage in the business of generating and supplying electricity for light, heat and power in Beverly and the petition was granted on June 15, and the company authorized to erect a plant with a minimum capacity of not less than thirty arc lights of nominally two thousand candle power each. The company on March, 1892, was authorized to change its name to the Beverly Gas & Electric Company. Expansion progressed rapidly under the new management. The Danvers Gas Light Company was taken over on March 6, 1911, and extensions made in other departments, to-day the company is supplying gas in Beverly and Danvers and electricity in Beverly, Wenham, Hamilton and Topsfield and also to Manchester through the Manchester Electric Company.

In the passing of years several men prominent in the affairs of the company have passed on including John I. Baker, the first mayor of Beverly, who was president and director from 1859 to 1897, Charles F. Prichard, a director and consulting engineer from 1886 to 1904, and Edward J. Hassett who was superintendent of the gas company department from 1886 to 1905. The officials of the company to-day are: Sidney W. Winslow, president; Andrew W. Rogers, treasurer and general manager, Charles R. Prichard, assistant manager, who with Herbert F. Winslow, Sidney W. Winslow, Jr., Charles R. Prichard, Chauncey W. Waldron and Edward H. Winslow, make up the board of directors.

How the company has grown in thirty years is told in the remarkably interesting statistics. The present assets of the company total $1,347,766.86. The assessed valuation of the company properties in 1916 was $1,712,750 and the total taxes paid were $28,656.27. There are seventy-seven miles of gas mains and 6,051 meters in use while the 89,249,000 ft. of gas was sold at a price of $1.30 a gross and $1.10 net a thousand feet. To-day the company uses miles of conduits for the carrying of electricity in addition to its overaerial system. There are 460 miles of overhead copper wire in use over 103 miles of street. There are 84 miles of underground conduits, single ducts and 101 miles of lead covered cable inducts covering twelve miles of streets. To serve customers there are 4,584 poles in use and there are 2,716 meters which must be read every month. The price of electricity is 12 cents gross and 10 cents net per kw.

Anderson, Ind., Artificial Plant to Be Put in Operation

It was recently announced by the Central Indiana Gas Company officials that arrangements had been made to operate the artificial gas plant on south Pearl Street, Anderson, Ind. on short notice at times when the supply of natural gas was short.

R. A. Zeigler, local manager for the gas company said J. H. Maxon, president and general manager of the Central Indiana Gas Company had authorized him to announce that the artifical gas plant here will be put in perfect operating condition at once and the holder will be kept filled. Should the supply of natural gas fail, the quantity kept in storage in the holder will be turned into the mains, and the manufacturing plant will be operated to its full capacity.

Riverside, R. I. to Have Cheaper Gas

The price of gas in Riverside, R. I. will be reduced from $1.35 to $1.10 on March 1 by the Providence Gas Company. Notice of this reduction has been filed with the Public Utilities Commission. A discount of 10 cents on each 1,000 ft. will be allowed if the bill be paid within 15 days of its date. This virtually means $1 gas for Riverside.

There have been many rumors to the effect that a reduction in the gas rates will result in the establishing of a big jewelry plant between the railroad and Bullock's Point Avenue. The number of new patrons of the gas company will probably be more than 200 when the new rates go into effect and in time the business may warrant a further reduction.

Gas Plant at Hamilton, Ohio, Shows Loss

According to a recent report made by the city auditor of Hamilton, Ohio, the city has lost $433.12 on its gas plant. The report of expenditures follows:

ORDINARY EXPENDITURES

Office expense—	
Salaries	$2,725.99
Stationery and printing	645.50
Incidentals	14.10
Total office expense	$3,385.59
Gas bought	$96,776.02
Distribution maintenance	13,756.17
Total ordinary expense	$113,917.78

EXTRAORDINARY EXPENDITURES

New services	$1,976.37
New meters	2,779.88
Total extraord. expense	$4,756.25
Guarantee deposits refunded	$1,245.63
Total expense	$119,919.66
Total receipts	$125,100.87
Gain in actual cash	$5,181.21
Add extraordinary expenditures for new services, etc., which are an asset to the plant	$4,756.25
Total gain for year	$9,937.46
Less unpaid bill for gas due the Ohio Fuel Supply Co.	$10,370.58
Deficit for the year 1916 over running expenses	433.12

NOTE—The above statement does not take in any expenditure on bonded debt.

Rates Reduced for Hanford, Cal.

A 20 per cent. reduction in the gas rate was announced to-day by the Hanford Gas & Power Company of Hanford, Cal. The reduction is effective as from Jan. 1. The gas company also announces that the state railroad commission has given the company permission to increase its bonded indebtedness to $70,000, the proceeds to be used for improving the system and increasing the service mains.

E. E. Bush, president of the company, states that the bonds will be prepared and disposed of as soon as possible in order that the company may make the improvements without delay.

Personal Notes

D. C. GREEN, manager of the Fort Smith Light & Traction Company, Fort Smith, Ark., addressed the members of the Rotary Club at the regular meeting of the club on Jan. 4, 1917. Mr. Green emphasized the need of co-operation in city building.

C. M. BREWER, manager of the Western States Gas & Electric Company, Richmond, Cal., division, was a member of the Decoration Committee in connection with the celebration attending the opening of the municipal wharf Dec. 30, 1916.

C. E. FAHRNEY, manager of the Ottumwa Railway & Light Company, has been elected director of the Ottumwa Commercial Club for the year 1917.

E. C. HATHAWAY, the retiring assistant general manager of the Virginia Railway & Power Company, was recently given a farewell dinner by about 60 officials and employees of the traction company and at the same time was presented with a handsome silver loving cup.

A. CRESSY MORRISON has been re-elected secretary of the International Acetylene Association. Mr. Morrison is located in the Forty-second Street Building, New York City.

D. D. WORKMAN, formerly connected with the Western United Gas & Electric Company of Aurora, Ill., has been appointed works superintendent of the Wisconsin Public Service Company at Green Bay, Wis.

A. F. JENKINS, Baltimore, Md., was elected president of the International Acetylene Association at that organization's recent annual meeting.

Construction Notes

New Plant Being Planned at Wabasha, Minn.

It is reported that plans are being drawn for Wabasha's new gas plant. Building operations will in all probability begin some time this coming spring. The Wabasha Gas Company was organized last summer with a capital of $20,000 and at that time it was expected that the company would be ready for business some time in April, 1917. A large number of subscriptions for gas service have been secured in the city.

Clearing Land for Enlargement of Webster, Mass., Plant

Employes of the Webster & Southbridge Gas & Electric Company have begun tearing down seven houses on Union Street, Webster, Mass. The building will be razed to make room for the extension work planned by the company.

The entire square that contains the old Dandurand and Trudeau properties will be razed, and while some of the buildings are occupied, notices have been given by the company to vacate.

The square, once one of the liveliest places in Webster, will pass out of existence to make room for the fast growing plant of the electric light and gas company. Just what will occupy the ground where the buildings stood has not been settled by the officials of the company It is probable that a gas container will occupy part of the space.

The seven buildings do not represent all that will be torn down, others on the street being marked for destruction to make room for the works planned by the company. With the exception of two houses on the west side of the street, the entire west side is owned by the com pany, and was bought some time ago with the idea of making room for extension. It is planned to have the square leveled so that work may be stared early in the spring, when the plans for the new work will be completed.

The company has contracted for an additional unit for its power plant to be used in the electrical end, and a 3200 kilowatt turbine has been bought, which will be delivered this winter. A new gas machine will be installed in a few weeks. It will be placed in the gas plant, and will supplant a smaller machine. The new machine has a capacity of 725,000 cu. ft. in 24 hrs. The foundation work for the machine has been constructed.

The growth of the works, which has been steady, has caused many additions and extensions to the original plant, which has been entirely swallowed by the new buildings of the company. The new work planned will mean one of the biggest increases in space ever undertaken, and the ground available will be used mainly for the gas department of the works.

Improvements at Stevens Point, Wis., Contemplated

An investigation into the condition of the gas plant and service in Stevens Point was begun recently by Mr. Silverthorne of Wausau, gas expert for the Wisconsin Valley Electric Company. Mr. Silverthorne will make a careful survey to ascertain just the present conditions, facilities and needs.

Manager Sikes, the company's local representative, says the company intends to push the gas department of its business here. The survey will be completed shortly and a more definite statement can be made thereafter.

Mr. Sikes adds that the company will make such improvements as the plant and business need.

The company has made no announcements regarding gas rates.

Eight Miles of Mains Completed in Santa Rosa District, Cal.

The eight miles of gas main which the Pacific Gas & Electric Company has been laying between Cotati and Petaluma, Cal., giving a bigger and better main from this city to Petaluma, is nearing completion. The pipe has been laid to within the city limits of Petaluma. It would have been completed earlier but for an accident to the ditching machine which had to be repaired.

The laying of the eight miles of pipe has been a big job and it has been successfully done. When the main is connected up the people en route and the supply in Petaluma will be better than ever. "Service" is what the Pacific Gas & Electric wants to give everywhere.

New York State Company to Issue Bonds for Construction

Application has been made by the Rome Gas, Electric Light & Power Company to the up-State Public Service Commission, says a dispatch from Albany, for authority to issue $3,500,000 first refunding thirty-year 5 per cent. bonds, $900,000 of the new bonds to be issued at once for the purpose of refunding an outstanding issue and to defray cost of construction work.

New Boiler Installed at Easton, Pa.

The first of two 1,160 hp. Babcock & Wilcox boilers now being installed at Dock Street plant of the Pennsylvania Utilities Company, Easton, Pa., was placed in service on Dec. 4, 1916. The addition of this boiler relieves the shortage in steam conditions and enables the company to supply all demands for power as well as extend service to several new loads which had been held up until a surplus supply of steam was available.

Large Oil Tank Erected at Colusa, Cal.

A new 20,000-gallon oil tank has just been erected at the Colusa gas works, increasing the oil capacity to 40,000 gallons. We will now be able, stated the report of the official in charge of that district of the Pacific Gas & Electric Company, to receive oil in 600-gallon lots, reducing our freight by 15 cents a barrel. This will amount to a saving of about $45 a month on our present consumption of oil.

A Central Plant for Murphysboro, Ill.

The Southern Illinois Gas Company, in which Congressman Copley of Aurora is interested, has acquired the plant at Duquoin, Ill. The new owners are building a central plant at Murphysboro and will lay pipes to a number of neighboring towns.

Main Being Constructed at Claremore, Okla.

A gas main is being constructed from the Stephens field to Claremore, Okla., and gas will be piped here for factory purposes. Two wells in the field are producing 5,000,000 cu. ft. of gas daily and those interested in supplying gas to factories in Claremore believe that the production can be materially increased.

Recent Patent Issues

Prepared by Royal E. Barnham, 833 Bond Building, Washington, D. C.

1,209,182 GAS-VALVE. Bert Lough and Robert E. Miller, Morgantown, W. Va.

1,209,890. AUTOMATIC GAS-EXTINGUISHER. George P. Schmitt, New York, N. Y.

1,210,471. GAS-PRODUCER. James A. Herrick, New Rochelle, N. Y.

1,210,598. METHOD OF WORKING GAS-PRODUCERS of the mond type. John B. Chadwick and Peter Hollinshead, Runcorn, England.

1,210,654. GAS-BURNER. George Keith, London, Eng., assignor of one-half to James Keith, same place.

1,211,395. TREATMENT OF COKE-OVEN GASES. Jegor I. Bronn, Rombach, Lorraine, Germany.

1,211,502. COKE-OVEN CONSTRUCTION. George E. Thackray, Westmont borough, Pa.

1,211,503. COKE-OVEN. George E. Thackray, Westmount Borough, Pa.

1,211,583. GAS-SAVING DEVICE. Charles H. Homeier, St. Paul, Minn.

1,211,975. AUTOMATIC GAS CUT-OFF. John W. Smith, Brooklyn, N. Y.